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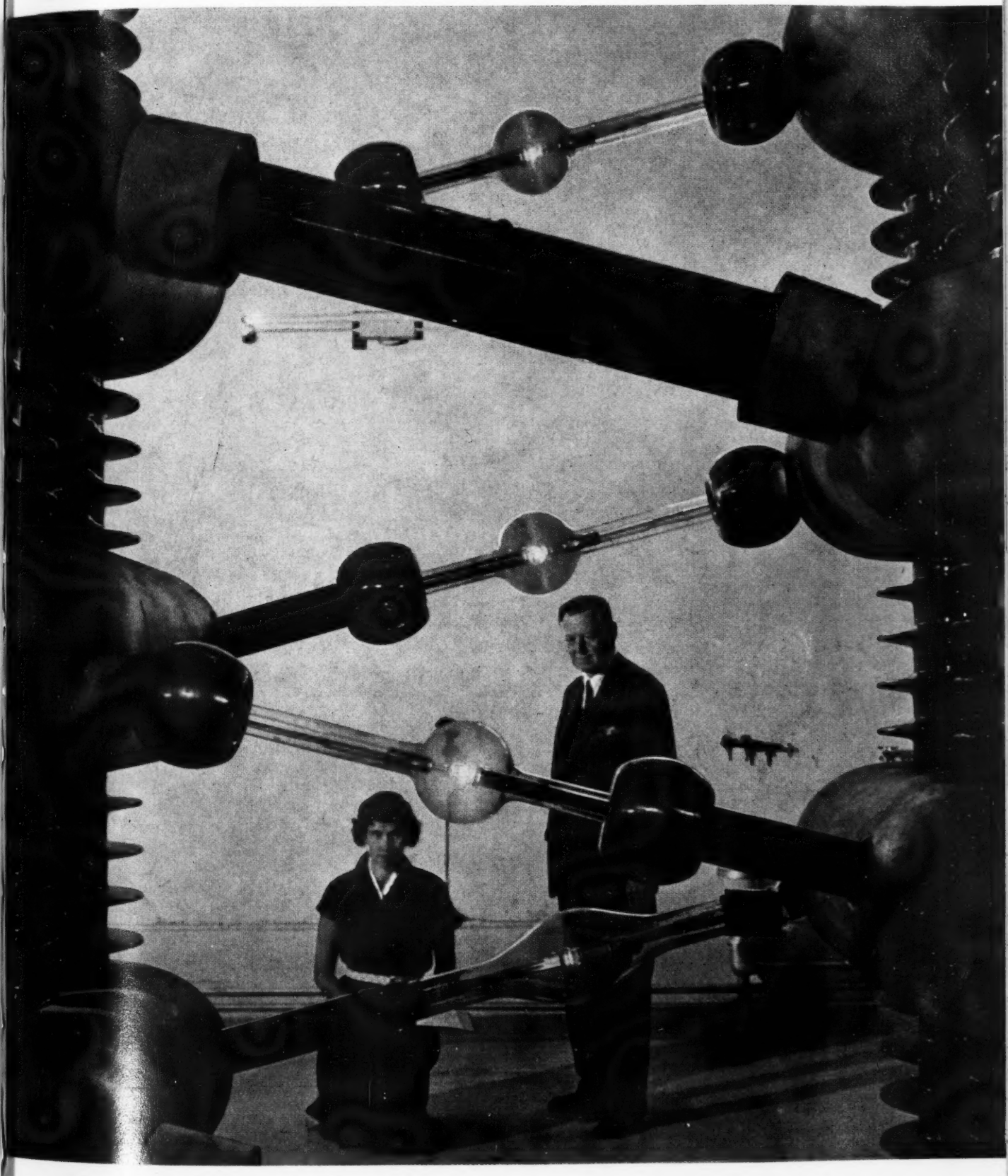

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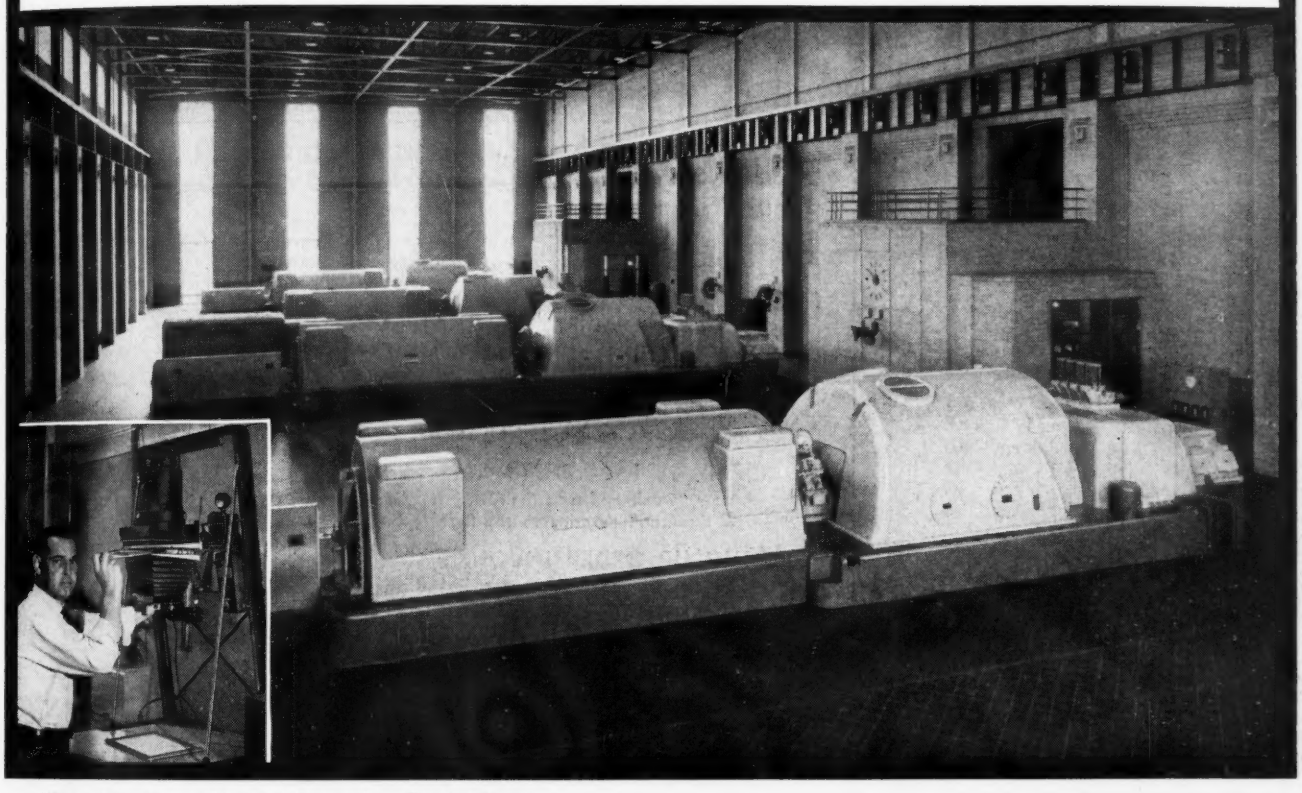

"The photo of myself was taken with a Beseler Topcon, printed on a Beseler enlarger and dried on a Beseler dryer."
C. G. MOYNIHAN

Mr. Cornelius G. Moynihan, of Albany, N. Y., official photographer for Niagara Mohawk Power Corporation's Eastern Division, handles virtually all company photography in that division without assistance. Constant call for black and white and color enlargements for engineering, public relations, advertising, and the company house organ posed this darkroom problem that the Beseler 45MCR solved.

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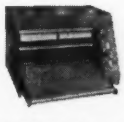
For Photo Dept. Beseler Topcon / For Lab  Beseler Dryers / For A-V Dept. Beseler Slide-King

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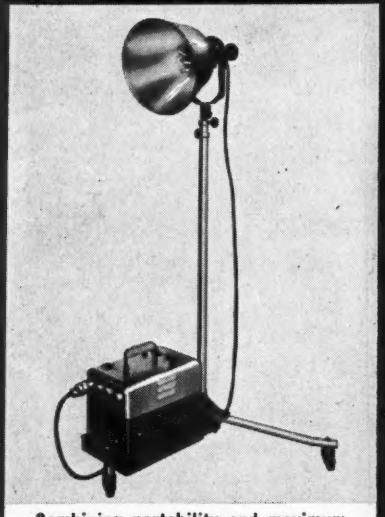

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Industrial Photography

THE MAGAZINE SERVING IN-PLANT TECHNICIANS
IN BUSINESS, INDUSTRY, GOVERNMENT AND SCIENCE

OCTOBER 1960

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3rd ANNUAL DIAZO — INDUSTRIAL PRODUCTION SECTION

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MISSILE MANUFACTURER THINKS BIG 24
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DIAZO TRANSPARENCIES FOR AUDIO-VISUAL AIDS 46
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The Fifth International high-speed Congress is being held in Washington, D.C., Oct. 17-22. Catch it before it's gone!

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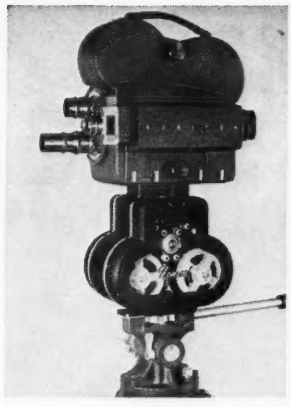
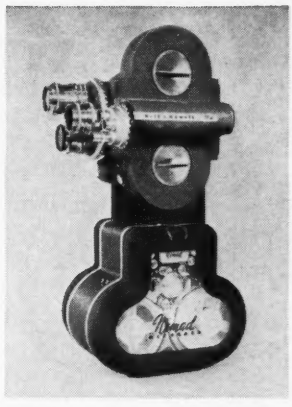
Nomad/Arriflex



Nomad/Auricon

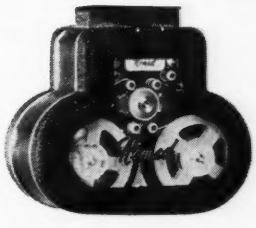


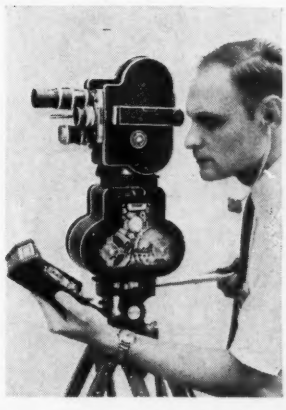
Nomad/Bell and Howell-70

Nomad/K-100

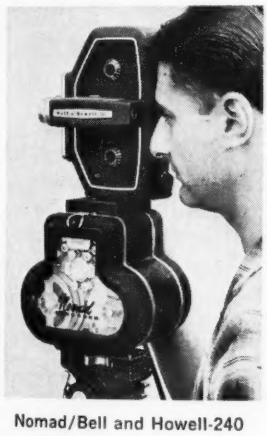
MAGNASYNC

The *Nomad* 7 lb. recorder-reproducer for 16mm movie cameras

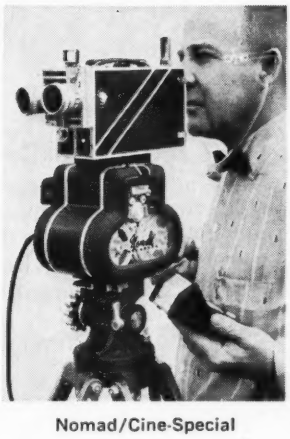




Nomad/Bolex



Nomad/Bell and Howell-240



Nomad/Cine-Special

...sprocket-hole FILM drive in perfect lip-sync! ■ "Magnasync's compact Nomad magnetic recorder-reproducer makes your 16mm camera a sound camera," says AMERICAN CINEMATOGRAPHER for March, 1960. "It's a 'natural' for freelance television news cameramen, industrial film photographers and others engaged in the production of low-budget 16mm sound films . . . The simplicity and versatility of the Nomad will appeal to all 16mm cameramen — from the amateur to the professional in need of ultra-portable sync sound equipment."

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Condensing the Columns

INDUSTRIAL ROUNDTABLE 8

Morris Gordon gives his views on why there is now a rash of layoffs in photo departments.

MOVIE CLINIC 12

Here's a unique way to make rear-illuminated movie titles.

REPRO MANAGER 14

Your repro department can produce both quantity and quality if you follow these tips.

TECHNICAL TRENDS 16

George Ashton tells how Britain's Jockey Club gets speedy processing of race footage.

About This Month's Cover

A Swedish industrial photographer, Karl Gullers, provides the shot for this month's cover which shows Nobel prize winner Manne Sigbahn with an assistant at the Nobel Institute in Stockholm. The transparency was used by the Standard Oil Company in one of a series of ads featuring write-ups on different countries. Rapho Guillumette, who represents Mr. Gullers in America, tells us that the photographer took the shot with a 4 x 5 Linhof using Ektachrome film with flash lighting.

INSTRUMENTATION 18

Exciting lab experiments show that film gains sensitivity when a high-voltage pulse is introduced during exposure.

PATENT NEWS 62

Dr. Sipley describes a patent for copying layouts which entails a glass negative.

MICRORECORDING 90

Your copy print is only as good as your original negative. So says this article on methods of copying documents.

AIGLONNE
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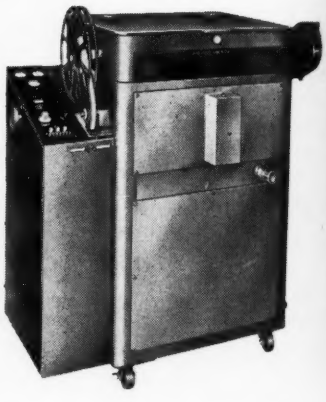
AUTOMATIC DAYLIGHT FILM PROCESSOR



This low-cost, quality compact unit develops perforated or unperforated motion picture, cineradiography and microfilm at up to 1400 ft/hr — of archival quality, without darkroom or skilled operator.

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NIKON F *for the man to whom photography is a form of creative self-expression*

The man or the camera—which is responsible for the *great* picture?

The truth is that it is neither of these alone, but rather the marriage of the two—the creative skill of the one and the responsive quality of the other. The man is essentially the master; his camera, the tool, working with him, implementing his skill, never diverting him from the picture purpose at hand.

What then of lens quality, mechanical precision, durability—are not these essential?

Yes—and more—they are indispensable. But, to speak of fine optics and precision and ruggedness without considering the ease and speed with which these qualities can be brought into play, is to neglect the most essential quality of them all.

Consider the Nikon F, and consider the confidence which even its appearance inspires. Trim, clean, uncluttered—there is the unmistakable feeling that this camera was born to respond and obey—that it was not expected for *you* to conform to *its* devices, nor for *you* to adapt *yourself* to *its* operational demands.

And this feeling grows on you even as you sight through the finder and observe the brightness and clarity of the screen, the accuracy in framing. You know that the picture you see is the picture you'll get—neither more nor less. You're not preoccupied having to remember to compensate for some error in the finder. And as you rotate the lens, the image seems to 'snap' in-and-out of focus. There's no mistaking when you're 'in'. And you release the shutter.

It is at this moment that the Nikon F comes to life. There's an almost imperceptible flutter in the finder—a hushed 'click' of the shutter—and the picture is yours—as *you* planned it—as *you* conceived it.

When you squeezed that button at the top of the camera, you set a chain of automatic operations into motion. The diaphragm automatically closed down to 'taking' aperture; the mirror flipped up; and the shutter flashed across the film plane at the precise speed you had selected for the exposure. Then, instantly, the diagraphm reopened, the mirror returned to viewing position, and there, in the finder, was the image—bright, clear—as if it had never gone. For, it all had taken place in less than the flicker of an eyelash.

There is every reason to marvel at the brilliant engineering which makes such split-second accuracy possible. And especially assuring is the knowledge that long before you squeezed that button, a camera out of the same production run was put through this action cycle more than 100,000 times in less than eight hours, to make absolutely certain that the camera in your hands could be depended upon for a lifetime of pictures as for the one picture of a lifetime.

See the Nikon F at any Franchised Nikon Dealer—$375 with Auto-Nikkor f1.4; with f2, $329.50—or write to Dept. IP-10.

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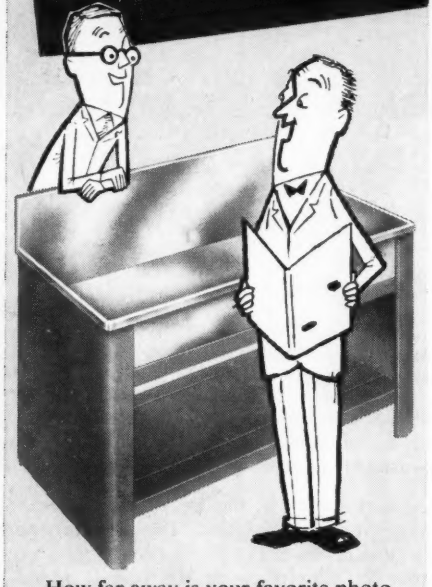

How far away is your favorite photo dealer—two blocks . . . a mile? Certainly not much farther. Nice to know he's on-the-spot to help you select the right sensitized goods, accessories and, of course, Leedal stainless steel equipment.

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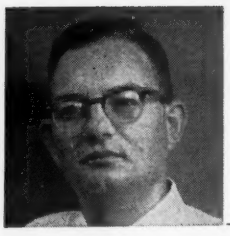


Editor's Mail

MITCHELL BADLER, Editor

More on ASA and DIN Ratings

In the June 1960 Editor's Mail I find a discussion on the relation between DIN and ASA ratings. I do not quite go along with your referring to a DIN Zeiss. The whole matter is a good demonstration of the difficulties encountered in standardization, and in particular in international agreements on standardization.

I have participated in many of the sessions of the German Standard Committee preparing the new standard. After the war, the Germans realized that the method of development in the old DIN standard (1931) was inadequate, and started a series of experiments in order to bring the DIN standard to as close a correspondence to the ASA standard as possible. At the end, the Germans changed the development conditions, the tolerances, and the actual exposures used during testing. They went into great pains to insure that the customer would not feel the transition from one system to the other, e.g. a film that would fulfill the requirements for a 21 DIN rating in 1931, could be expected to fulfill the requirements for the same rating in 1960, and vice versa.

The difficulties encountered in the correlation between DIN and ASA occurred for three reasons. Up to 1959, the German did not have a standard for the calibration of exposure meters. The individual manufacturer took upon himself the responsibility for his calibration. He usually set his own standards as a result of practicals. This was particularly difficult shortly after the war when most German film manufacturers were not able to maintain the speed requirements of the DIN standard and were not willing to admit this. The manufacturers by this fact were misled in the actual mutual relation between DIN and ASA. Around 1951 this period of uncertainty was ended.

The other two reasons for deviations are found in the different methods of measurement and in the sampling method. The American standard prescribes a certain age of the film type before it can be tested. The German standard tries to achieve this same goal by a guarantee. A manufacturer using the DIN sign must be willing to guarantee that a film tested during its official lifetime must be within the tolerance limits of 1 DIN. This is probably due to the fact that the DIN sign is a trade name used by the German Standard Association. A manufacturer who constantly violates the guarantee clause in the standard can be denied the right to use the trademark. The difference in the "old" and "new" relations is primarily a result of a change in judging the importance of the differences in the sampling methods. — Dr. G. W. Schumann, Binghamton, N. Y.

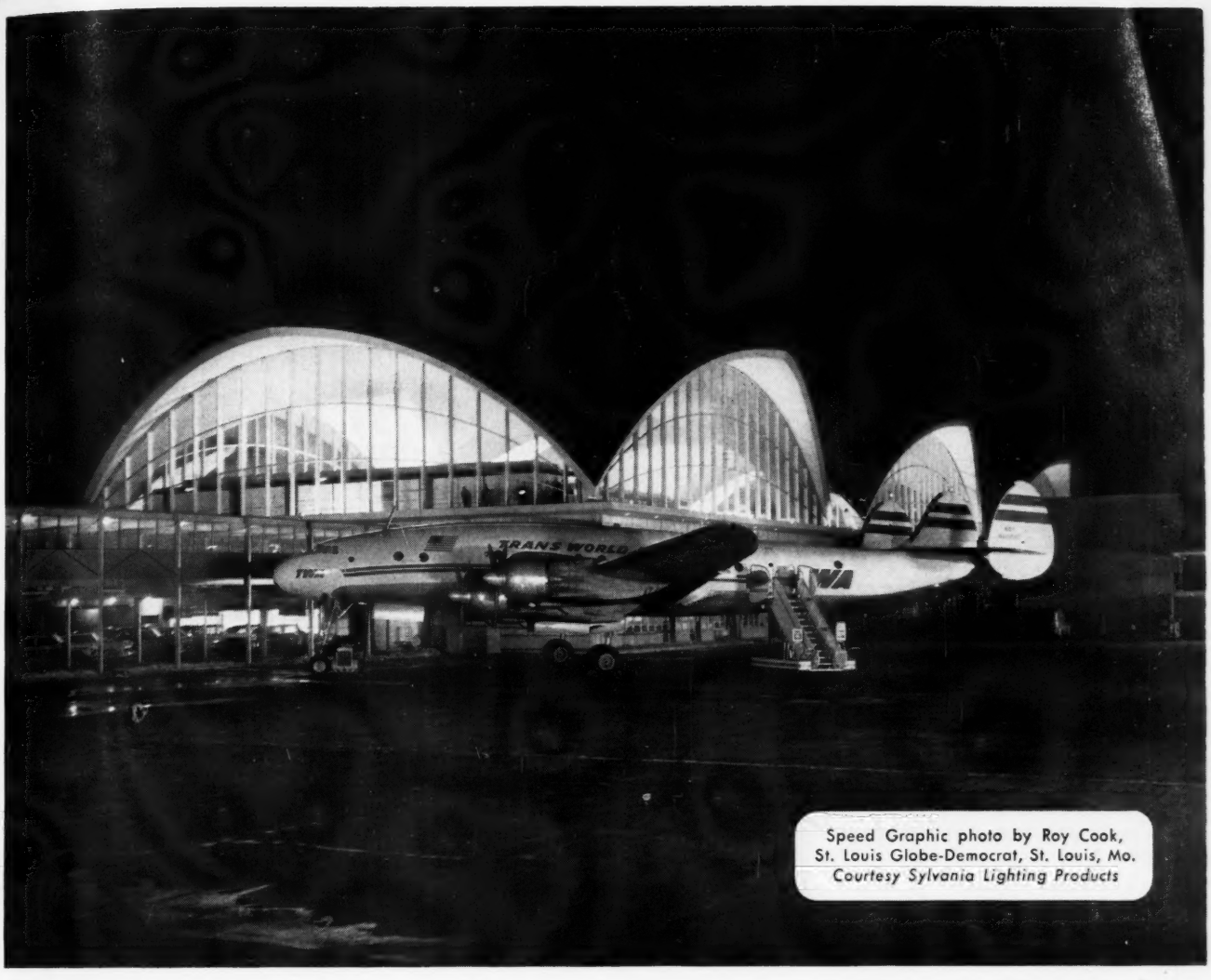
. . . Lebanon

A friend of mine in the U.S. sends me copies of your magazine. . . . I was particularly interested in the article "Electronic Flash for Short Run Color" (*Feb. 1960, p. 40*). . . . may I have more information on specific equipment? — N. B. Nercessian, Beirut, Lebanon.

Reader Nercessian has been put in contact with sources of supply and information.

Next Month in Industrial Photography

FIRST AWARDS FOR ANNUAL REPORTS
INFORMATION-PACKED LIGHTING SECTION



Speed Graphic photo by Roy Cook,
St. Louis Globe-Democrat, St. Louis, Mo.
Courtesy Sylvania Lighting Products

"When it's ONE TIME—ONE SHOT, I can always depend on my Graphic*"

says Roy Cook, Asst. Chief Photographer, St. Louis Globe-Democrat

The dependability of a Graphic knows no equal. That's why photographers whose livelihood depends on superior results under any and all conditions . . . in situations where one chance is the only chance . . . depend on Graphic cameras.

The picture above, by Roy Cook, is an example. Because 100 flash bulbs were used for lighting, there was only one chance . . . so he used his Speed Graphic "to be sure of my shot." It was taken at Lambert Field, St. Louis, at 10:30 P.M. on Saturday, March 19. Diaphragm was set at f/32. The shot was set up and staged by Sylvania Lighting Products to herald the opening of the MPDFA Convention.

Says Mr. Cook: "I used the Speed Graphic because it gave me the wide coverage I needed for this unusual shot. When it's *one time-one shot*, I can always depend on my Graphic."

*Trade Mark.
For full information regarding Graphic cameras, see your Graflex dealer. Or, write Dept. IP-100, Graflex, Inc., Rochester 3, N. Y.

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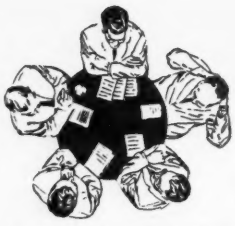
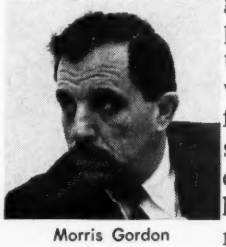


Industrial Roundtable

by **MORRIS GORDON**, *Western Electric*

A Wrong Mental Attitude

At the recent National Industrial Photographic Conference in Chicago, I encountered much concern about a rash of layoffs occurring in industrial photographic departments. At the time, I was at a loss for reasons since the general business level remains relatively high around the country. However, since my return from Chicago, I have had time to give some serious thought to the situation and to come up with what I consider reasonable explanations.



Morris Gordon

Much of management's disenchantment with photographers seems to stem from a wrong mental attitude on the part of the lensmen. To begin with, it appears to me that too many photographers are concerned only with satisfying the immediate photographic requirement and then sitting back and waiting for the next assignment. This is a serious mistake. The value of a photographer to his company increases a thousandfold when he discovers new uses for photography in such areas as cost reduction, public relations, advertising and personnel relations. Photographers must transcend their immediate assignments if they are to be of value to their industries.

I would like to use my own experience as an example. When I went to work for the Western Electric Company, my sole assignment was to illustrate its publication, *WE* magazine. After a time I started pointing out other areas where photography could help do a better job. Because I created more work than I myself could handle, in time I had a staff. Today, the photographic unit I head has four still men, two motion picture cameramen, a laboratory technician, a file clerk, a motion picture librarian and two secretaries. It will continue to grow if it continues to find new ways to help the company. We don't add people just to develop an empire. The demand for our services is the only criterion as to when we hire a new man. Building empires just for the sake of bigness is a fatal mistake because unless it is soundly based, the auditors or the efficiency experts will disembowel the empire 'ere long.

The same applies to equipment. Buying every gadget and gimmick that comes down the turnpike is also a serious mistake, one calculated to sour management on photography. In my organization we only acquire that which is actually needed and which will give us effective and efficient service.

Of course, an equally bad mistake is to save pennies at the cost of dollars. When we *do* need a piece of equipment, we buy that which will give us the most service for the longest period of time even though the initial cost may be considerably larger. Equipment which spends most of the time in the repair shop isn't worth owning.

Another attitude which leaves a bad taste in the mouths of top management is the attitude too many photographers assume upon acquiring a title such as Photographic Manager, or Supervisor, or Chief Photographer. They begin to meddle in areas of production, administration and policy which are not their proper purview.

What this means is that no matter what rank a photographer

continued on page 84

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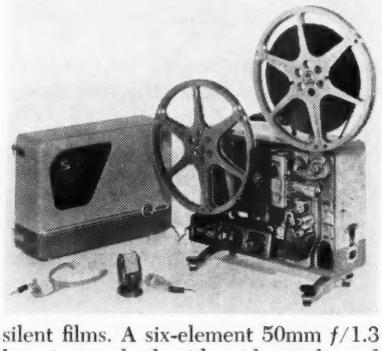
Bert Lefkowitz views the New Products

An easy way to keep posted. Each item featured below has a key number. For more information — without obligation — circle same number on Readers Inquiry Card (pages 81-82).

16mm Magnetic-Optical Projector 101

A 16mm magnetic-optical sound projector aimed for the industrial and audio-visual user has been introduced by *Paillard, Inc.* The new unit, labeled the Bolex S-221, projects sound or silent films at any speed from 16 to 24 fps and enables the user to record sound directly on his film. It allows erasure and overplay of sound; the latter feature makes it possible to record one track directly over another and thus build and test a complete soundtrack. The S-221 is a complete PA system, containing a 15-watt, seven-tube amplifier with a built-in mixer, which can be used for special effects. The projector, with a 2000′ film capacity, has pushbutton sprocket guides for simple threading and separate threading paths for optical, magnetic and



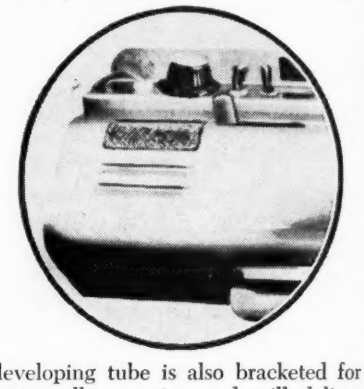
silent films. A six-element 50mm *f*/1.3 lens is standard with wide angle and telephoto lens available. The complete unit, including an 8-inch speaker built into a removable lid, microphone, earphone, and projector weighs 52 pounds. Price: $1,250.

Electronic Flash 102

The Series 500 line of the *American Speedlight Corp.* has been augmented with the introduction of a 400 watt-second power supply, main light and folding caster base lightweight stand. These components may be used with other items in the 500 line for greater versatility. The B504 Power Supply has controls for full, half, quarter and eighth power and the built-in modeling lamp is in the same ratio as the flash. The L516 Light Unit uses a flash tube with internal modeling lamp mounted in a broad 16″ reflector.

Whiteprinter 103

Rotolite Sales Corp. has announced their Expeediter Diazo Whiteprinter which is claimed to be the lowest priced machine in its class on the market. Instead of the usual table model, the Expeediter has been designed to mount on the wall and requires very little space. Single lamp construction contributes to the simplicity and low cost of the unit. The new speed control does away with gear changing and is adjusted with top-mounted finger tip controls. The



developing tube is also bracketed for easy wall mounting and will deliver a finished print in less than a minute. Price: from $129.50.

Processing Aid 104

From the home of the Squeege-It comes the Dandy Dunker, another labor saving device. *Tomorrow Inc.* has recently introduced a film processing basket which is of truly original design. Constructed with walls of clear plexiglass, it has a recessed floor of glass plastic honeycomb, with 3/16″ open cells to facilitate free flow of chemicals during agitation. Each cell has minute filaments or "hair" to secure each sheet at the bottom by means of friction. Loading is accomplished by the use of a plexiglass guide, which has a curved slot to help position the film down along the grooves in the basket walls. Once the films are in place they are secured by top retainers cushioned with closed cell neoprene. Of particular interest to color processors is the ability to give the re-exposure without unloading for up to 50 sheets. Available in three sizes for 4″ x 5″ and 5″ x 7″ films, the Dandy Dunker lists from $26.85 to $39.95.

continued on page 62

Sharper than a needle...

Uncropped, unretouched photo by Harvey Shaman using Minolta SR-1, 100 mm Rokkor lens at f:16 for depth of field, extension bellows at 0.5 magnification, strobe light at 1/50 sec.

Captured by the rare earth Rokkor lens, exclusive with

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Proof again! Minolta, not price, is your best guide to quality.

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Movie Titles—The Absolute End

by JAMES R. OSWALD

A mouth-watering cake icing is like a well-executed movie title. Both invite the viewer to investigate further. An imaginative opening title will capture the viewer's imagination so he watches the entire movie with sustained interest. Likewise, an unusual sign-off will leave him with a lasting impression of the movie. That's why it's smart for the industrial movie man to plan his titling carefully.

The most popular type of title is the superimposed one, where the title appears over a live background. This requires that two exposures be made, one for the background scene and one for the title copy.

It is customary to photograph the background scene first, then shoot the title copy against a black, non-reflecting surface. The black background won't register on the film but the lettering will. There are two objections to this method: (1) It is hard to light the title card so that stray reflections don't emanate from the background surface, (2) Difficulties arise when an amateur artist tries to letter with white ink on black paper.

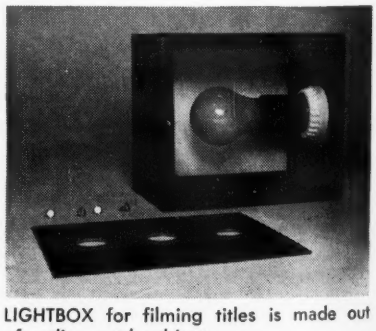
I suggest making titles by rear illumination instead. With this method the original artwork has black printing against a white background. A ground glass focusing camera loaded with Eastman Kodak's Contrast Process Ortho film photographs the artwork. Light values on the negative will be a reversed, with the lettering transparent.

With this method of filming titles you can compose and reduce the copy when photographing it. The filmed version can be made with the intention of slipping it into a titler easel or taping it to the lightbox which I have contrived.

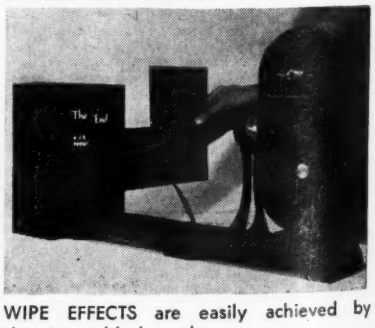
For the lightbox I use a 7½- to 15-watt bulb installed in a 6 x5 x 4-inch metal utility cabinet sold at radio and electronic supply houses. One of the two removable cover plates of the box is replaced with diffusing glass affixed to the front of the unit with masking tape. The other cover is punched with three ¾-inch holes to ventilate the light bulb, which screws into a cleat-type socket fastened inside the box.

In building a lighting unit it should be designed for ready alignment with the titling apparatus, if you plan to use such equipment. Suitable propping to raise the unit to center with the optical axis of the movie camera is obvious.

One last warning—room lights should be out during the shooting of rear-illuminated slides to prevent stray light bouncing off the front of the diffusing glass or the title copy itself. □

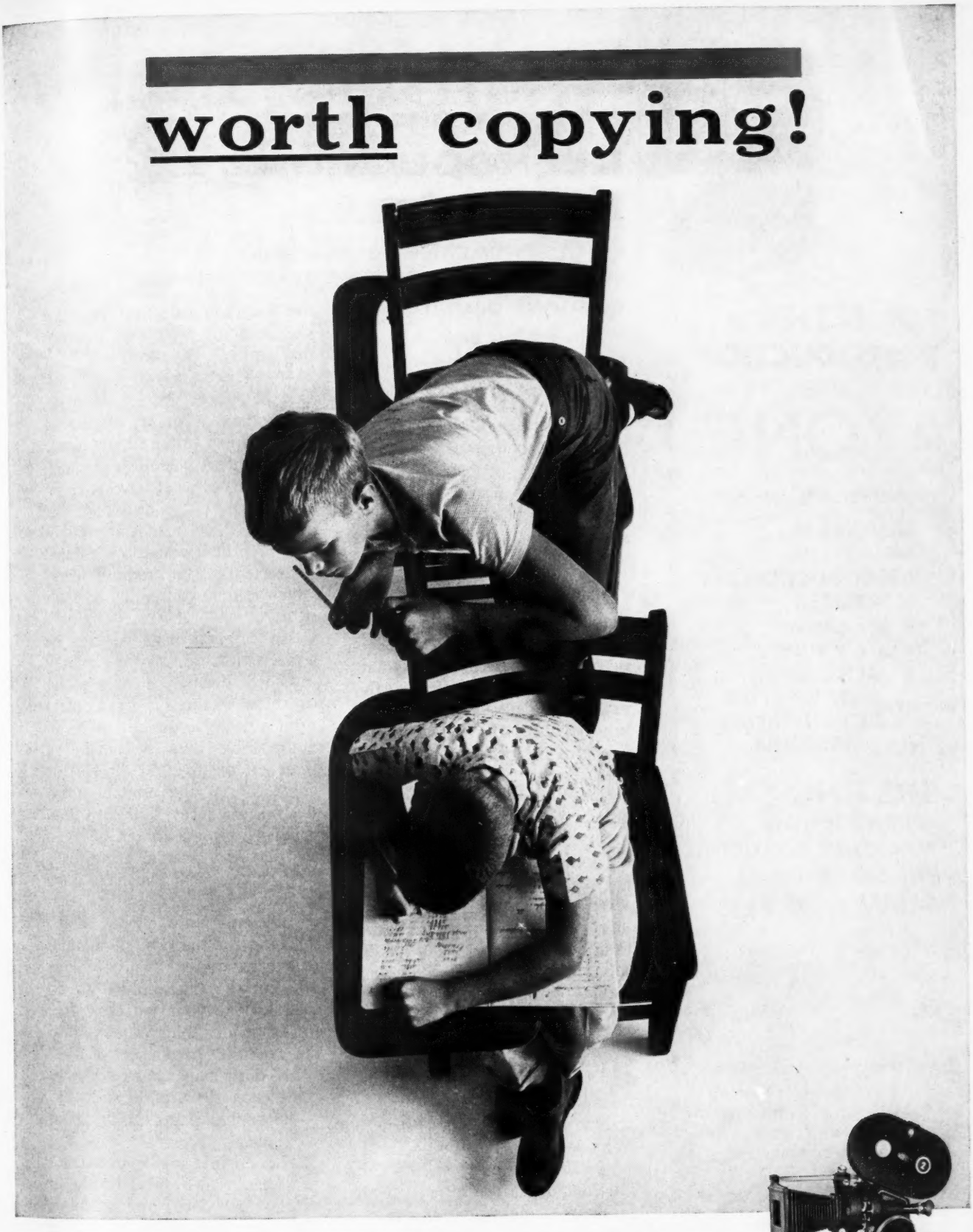


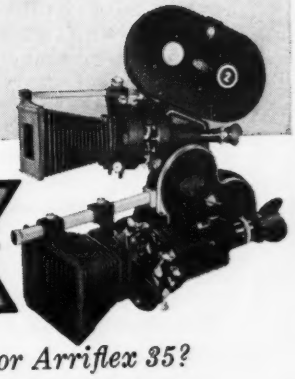
LIGHTBOX for filming titles is made out of radio metal cabinet.



WIPE EFFECTS are easily achieved by drawing a black card across copy.

worth copying!





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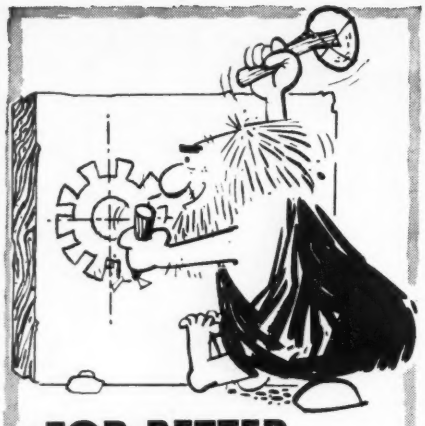

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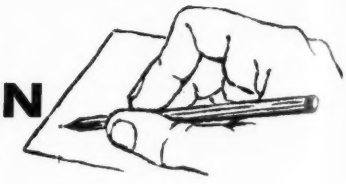


by HAL DENSTMAN and MORT SCHULTZ,
Lockheed Electronics Co., Stavid Division

QUALITY VS. QUANTITY

All small- and medium-size reproduction facilities seem to have at least one problem in common: how do you produce large quantities of work with insufficient manpower and, in many cases, inadequate equipment? Or, to put it more pointedly, how does one maintain high quality and still produce the required quantities with a small staff?

It's obvious photographers and those engaged in reproduction are craftsmen who take pride in turning out the highest quality possible. Unfortunately, this pride often deters them from their job of getting the work into the hands of the people who need it when they need it.

This brings us to the one basic point: many of us are building in a quality that is *not* necessary. By doing so, the small laboratory is putting an undue drain on its services. Personnel in these labs, unlike technicians in larger facilities, are often required to handle a variety of assignments from making the photograph right through to producing the final negatives for offset.

One way to eliminate the problem is to examine the requirements carefully and fit the proper technique to the job. Analyze every job from the standpoint of who initiated the service request. An engineer, a draftsman, an art director — all have different requirements for the finished product. What you must do initially is determine to what use your customer is going to put the product. Is it going to be for a publicity release — for reference by engineers inside the company — for a guide by machinists and draftsmen? Once you determine the use, you can then establish standards by which to produce the work.

In the engineering field, for example, there are requirements to produce a great volume of photographic prints for reference by engineers, shop personnel, draftsmen, or what have you. In this case, by considering the diazo process for mass production of prints, you can eliminate unnecessary darkroom work, which is time-consuming and expensive.

An original negative can be converted to a fairly high quality screened diazo print by either of these methods: 1) Contact print a negative directly on to an autopositive film to make a screened positive; 2) project or contact print the original negative on to a sheet of process film, using a magenta screen between the film and original negative.

In effect, what you have done is make a master positive that can be run through the diazo machine for the desired number of finished copies. Not only have you cut the time needed to do this, leaving your lab crew free for other jobs, but you have also cut expense. Each sheet of 8½" x 11" diazo paper costs about ½ cent; each sheet of 8½" x 11" photographic paper costs about 10 cents.

The engineering reproduction field has grown fantastically in the last 10 years, and promises even more tremendous growth in the next 10. Manufacturers of materials have kept pace with this growth. There are now materials available that can greatly reduce the time spent on a particular job.

As a reproduction manager, or

continued on page 71

What could possibly make a camera worth $500?

THE work you can do with it, nothing else.

The precision and resolving power, for example, that have led many studio photographers to use a Hasselblad 2¼ x 2¼ single-lens reflex instead of an 8 x 10 view camera.

The interchangeability of lenses, film backs and accessories—over 100 camera set-ups in all—that enables a professional to carry a Hasselblad instead of half his studio on location assignments.

The automatic aids that let the pro concentrate on his subject instead of the camera, and help the amateur make up in part for the intimate knowledge of light and optics that marks professional work.

Hasselblad lenses, for instance, make color and detail almost automatically perfect. These lenses have Synchro-Compur shutters and are made by Carl Zeiss of the best optical glass in the world. Resolving power—the acid test of any lens—permits greater enlargements than virtually any other lens made today.

The Hasselblad reflex system alone costs more to make than many cameras sell for. On its ground glass viewer you see a print-size preview of the quality you will get—focus, depth of field right through the lens (and no parallax). A pop-up magnifier even shows details too tiny for the naked eye.

Diaphragms of Hasselblad lenses are automatic. They remain open until you shoot, so that your view cannot get away from you. If you wish, you can also stop the diaphragm down by hand.

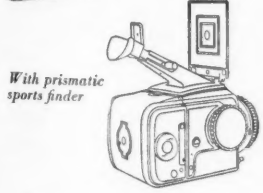
The EVS system synchronizes diaphragm openings to shutter speeds. You simply set your lens for a code number and your speed and aperture will be automatically aligned. You can then change to any other speed and your aperture will change with it—automatically.

Hasselblad interchangeability? You can switch from color to black and white in mid-roll, or from telephoto to wide angle, or to a sports viewer, or to a magnifying hood for shots through a microscope. You can set up for almost every shot known to photography in seconds.

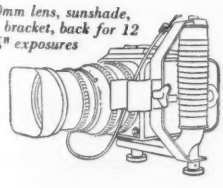
What could possibly make a camera worth $500? The work you can do with it, nothing else. With Zeiss Planar 80mm *f*/2.8 lens, $489.50.

Write Dept. HIP-10 for literature and the name of your nearest Hasselblad dealer. PAILLARD Incorporated, 100 Sixth Avenue, New York 13, New York.

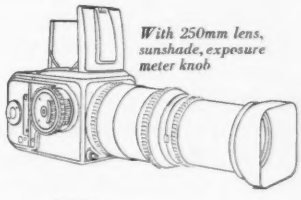
With magnifying hood, 60mm lens, back for 16 1⅝" x 2¼" exposures, exposure meter knob



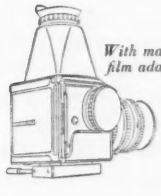
With prismatic sports finder



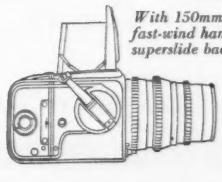
With 150mm lens, sunshade, flash gun bracket, back for 12 2¼" x 2¼" exposures



With 250mm lens, sunshade, exposure meter knob



With magnifying hood, cut film adaptor and holder



With 150mm lens, fast-wind handle, 2" x 2" superslide back

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New

WESTON MASTER IV

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- Sensitivity increased 100%
- Practical ON-OFF pointer lock
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- Improved dial readability
- Reflected and incident light
- Rugged "spring suspended" movement
- Simplified exposure dial

another DAYSTROM product

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Technical Trends

by GEORGE ASHTON

Rapid Processing

Considerable attention continues to be devoted to methods of speeding up the processing of conventional silver halide photographic materials, doubtless as a result of the continued pressure from competitive systems of data recording. The latest "at-work" European system in this class is an outgrowth of the rapid processing projector of Kelvin Hughes, which was described in INDUSTRIAL PHOTOGRAPHY in May 1959.

This system has been developed for the Jockey Club of Great Britain and is operated by the Race Finish Recording Company. The latter company has for some years operated standard race finish photographic equipment on race courses throughout the world, and the new equipment supplements their existing cameras. By its use, a high quality 16mm film of the last three furlongs can be shown to the judges less than five minutes after the end of the race.

The use of 16mm film for a camera patrol at race courses is not, of course, particularly novel; but the new system has some exceedingly interesting features and some advantages over available methods, including video tape recordings.

The end of the race is photographed by three Arriflex cameras, one, with a medium-long focus lens, set up in the stand and two others set up together on a portable tower and positioned to give a head-on view of the finish. These two cameras are fitted with the 12-inch and six inch lenses. The camera with the 12-inch lens is used to record from about three furlongs from the post; the camera with the six inch lens takes over at about two furlongs and carries on to the end of the race.

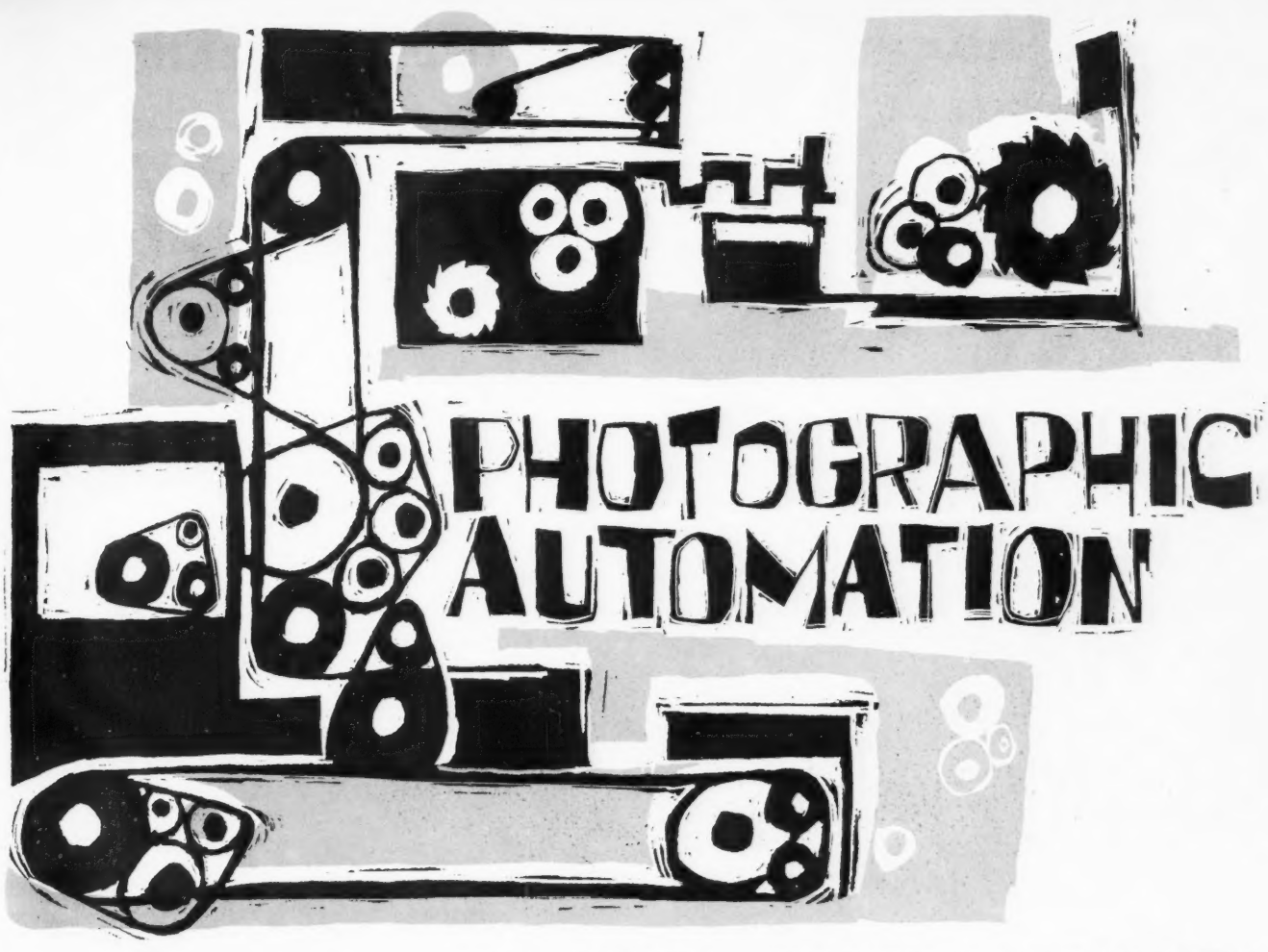
All three cameras are fitted with automatic exposure control developed by Kelvin Hughes specially for the job and working from the reflected image provided by the Arriflex mirror shutter.

The film used is a 16mm version of one of the four Ilford films originally designed for the rapid processing projector; it is panchromatic, gives high resolution and is coded simply RX. For the race finish recording application, the film is supplied in standard 400 ft. rolls and is loaded in the normal Arriflex magazines.

Film processing is carried out in a mobile laboratory, using an extremely compact processing machine, which can deliver a finished positive in one minute, dry to dry. Like the 35 mm processing unit of the radar recorder, the processor does not fix the film in the conventional way but simply develops the exposed silver halide to silver, which is then bleached, leaving a positive image in white, unexposed silver halide. This type of image, if projected with the fairly diffuse type of light of a conventional projector gives rather low contrast. But when projected in the specially modified Simplex-Ampro, which is used by the judges if an objection is raised, the quality is in every way normal. This projector is fitted with a compact source mercury arc, and the highly specular light which this source provides gives excellent contrast and a resolving power of over 100 lines/mm from the Ilford RX film.

The processor operates at a speed of 40 feet/min., and the film is fed directly to a projector in the mobile trailer laboratory. This projector runs at the stand-

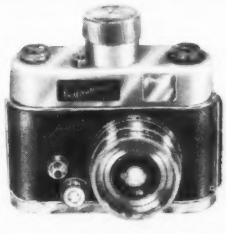
continued on page 54



ROBOT 35mm CAMERA—NUCLEUS OF A COMPLETE ELECTRO-AUTOMATIC RECORDING SYSTEM

For the past 25 years, the ROBOT manufacturers have concentrated their efforts on the development of an entire system of precision AUTOMATIC recording equipment. Built around the 3 basic ROBOT AUTOMATIC 35mm cameras, according to the construction-unit principle, the ROBOT System can be easily adapted to any photographic registration problem.

ROBOT ROYAL S/Sa: 24x 36mm, 24x24mm or 18x24mm frames; with coupled rangefinder/viewfinder; automatic ONE-by-ONE shots or KINOGRAPHIC SEQUENCE for bursts of 5-6 frames per second. From $169.00.



ROBOT STAR II: 24x24mm frames; with lumiframe viewfinder; single motor for up to 20 exposures or double motor for up to 55 exposures *without rewinding*. From $109.00.

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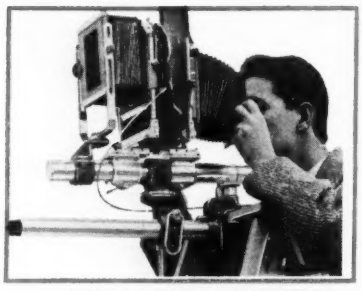

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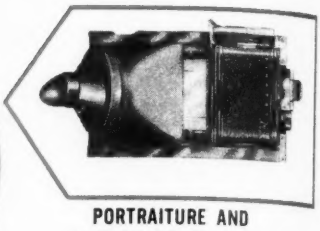

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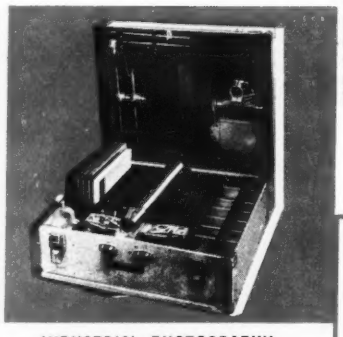

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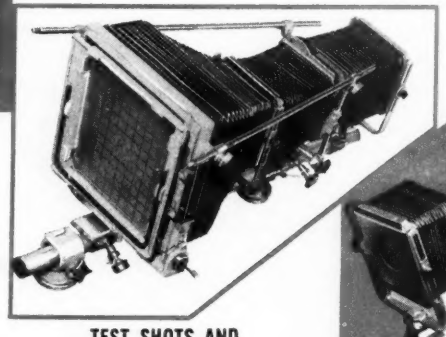

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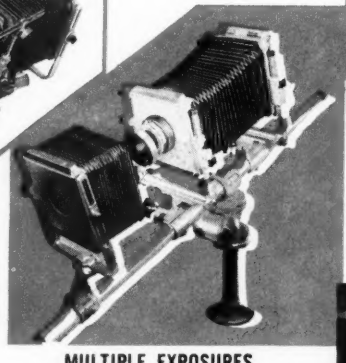
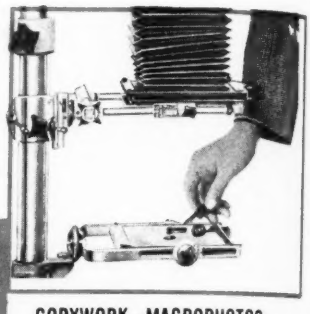
Built-in registration pins, multicolor plate holders and stabilization rods adapt the SINAR 8x10″ for color separation and process work. The Rapid Adapter, for 2¼x3¼″ or 2¼x2¼″, has a film-flattening glass plate for small size color separation.



MULTIPLE EXPOSURES

Groundglass has ruled grid and center cross; auxiliary frame holds masks and is easily adjustable, while detachable mat box bellows is adjustable in any direction for photo montages and trick shots, even with color film.



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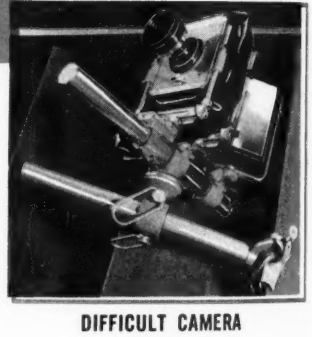

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As IP Goes to Press

A new film which makes finished pictures in just 10 seconds in Polaroid Land Cameras has been marketed. Previously, 60 seconds were required to process pictures in Land cameras. The new film has 50 to 100 per cent greater resolving power to produce higher quality photographs.

At the present time only one of the black-and-white film types currently available for Polaroid Land cameras has been converted to the 10-second material — the Type 47 (3000 Speed) Polaroid Land Picture Roll, which makes eight postcard-size prints per roll.

Conversion of Polaroid's other films will take place over the next few months, and ultimately all Polaroid Land films will produce pictures in 10 seconds. Retail prices will remain the same.

Time Not Critical

Even though the new film's development time has been radically shortened, the time is not particularly critical, providing that eight or nine seconds are allowed after pulling the paper tab out of the camera to process the picture. If development time is less than this, pictures may be somewhat faint or uneven in tone.

Above the recommended 10-second development, there is considerable latitude, and development as long as 60 seconds will still produce perfectly acceptable prints, although contrast will increase.

The 10-second film is the sharpest material that has ever been produced by the company. Speed of the Type 47 picture roll is still held at ASA 3200, which makes the film capable of taking pictures by available light indoors, day or night.

Supplies of the new Type 47 film are now available from industrial photographic dealers.

You get top quality, durability, advanced design with

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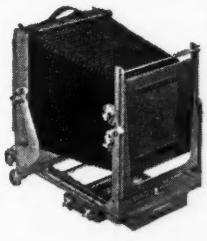
CALUMET 8x10 VIEW CAMERA



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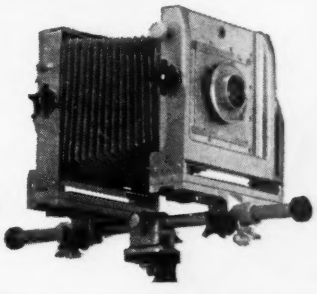
CALUMET 4x5 VIEW CAMERA



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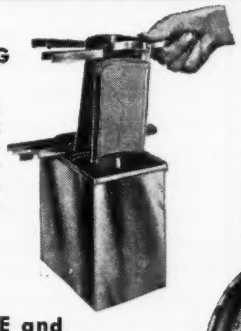

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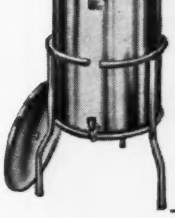

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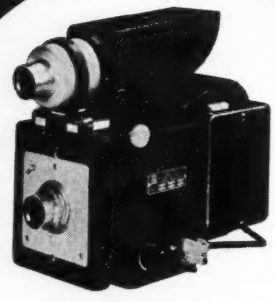

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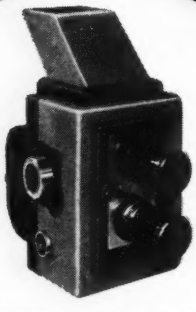

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High-Voltage Pulses

by JEROME ROTHSTEIN
Edgerton, Germeshausen and Grier

It has been found that the application of a high-voltage pulse to photographic emulsions during exposure can increase speed, contrast and sensitivity.

The idea which suggested carrying out these experiments started from the concept that light frees electrons, which migrate to "sensitivity specks," at which silver is freed relatively rapidly at a later stage of the development process. It was thought that if a high-voltage pulse were applied to the film while the free electrons were still migrating, then an "avalanche effect" might occur which would simulate a higher light intensity as far as the film was concerned.

Experiments were tried in which Kodalith stripping film (ortho) was stripped from its plastic support and the binding dissolved off in acetone. The bare emulsion, which was about five microns thick, was placed between transparent electrodes. These were glass coated with tin oxide. Films were exposed in a Mark VI Xenon Flash Tube Sensitometer, manufactured by Edgerton, Germeshausen and Grier, Inc. A gray scale placed between the flash tube and the film gave a series of exposure steps. The nominal duration of the flash was 1/10,000 second.

Voltage was applied by means of a dual thyratron circuit. A large condenser was charged up from a variable D. C. supply. When the first thyratron was triggered, this voltage appeared across the transparent electrodes. When the second thyratron was triggered, the condenser and electrodes discharged through it to ground. From one to two thousand volts were used, corresponding to a field in the emulsion between two and four million volts per centimeter. These high fields would puncture the emulsion if they were applied for too long a time. In these experiments, twelve millionths of a second was usually the length of time during which voltage was applied.

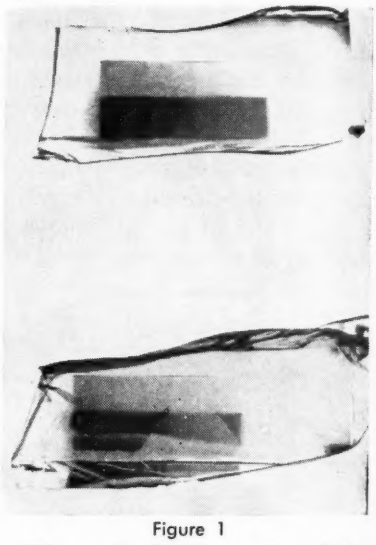

Figure 1

Figure 1 shows results of the first successful experiment. A bubble had been trapped under the emulsion so that on one side, part of the emulsion made contact with the electrode and part of it did not. This meant losing some of the exposure steps, but others had the advantage of showing areas where "avalanching" could occur and areas where it could not, within the same exposure step. As can be seen these "bubble points" match the control film, for the same exposure step, very well. It had been intended to use a 50 microsecond voltage pulse but as can be seen, the film was punctured by such a long pulse and the time of application of the pulse could have been much less.

A number of similar experiments were tried and the overall

continued on page 70

Industrial Photography

OCTOBER

VOLUME 9 NUMBER 10

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SHOP TALK

A Repeated Theme: Up Diazo

This month the major theme of our issue is IP's third annual report on diazotype reproduction. We published our first report on the status of diazotype materials in October 1958. Thousands of extra copies of that issue were requested and distributed by industry members at conventions and meetings throughout the country. We were pleased to publish our second progress report last year and it also received wide acclaim and distribution. These progress reports reflect the growth of diazo materials applications in industry. Figures recently released by the National Association of Blueprint and Diazotype Coaters indicated that net sales of diazotype products hit an all time high in March. However, we hardly need statistics to confirm the astounding growth in the varied use of these reproduction materials.

INDUSTRIAL PHOTOGRAPHY is proud of the role the magazine has played in reporting the application of diazo in new areas as well as in traditional engineering reproduction. We would like to take this opportunity, too, to thank the members of the diazo industry for their many kind and appreciated comments on the assistance IP has lent the industry.

THE EDITORS

● October promises to be a busy month for meetings and conferences. In addition to the monthly society gatherings the following are scheduled: National Association of Photo Lithographers, Chicago, Oct. 5-8 . . . Fourth Industrial Film & Audio-Visual Exhibition, New York, Oct. 10-13 . . . 12th Annual Convention of the Audio Engineering Society, New York, Oct. 11-14 . . . R.I.T. Conference on a centralized information service for the graphic arts, Rochester, Oct. 13-14 . . . SPSE Rapid Processing Symposium, Washington, D.C., Oct. 14-15 . . . Fifth International High Speed Congress, Washington, D.C., Oct. 17-22 . . . 74th annual convention of the Printing Industry of America, Washington, D.C., Oct. 24-28.

Overseas, The Institute of British Photographers is holding a special three-day conference for industrial staff and cine photographers in London, Oct. 10-12. The industrial program has been arranged in cooperation with the industrial division of PPofA and will highlight "Industrial Photography in the U.S.A." Among the speakers will be IP's Morris Gordon, Ed Purrington, former photo and graphic arts chief at Ford Motor Company, Arthur Rothstein, Look magazine, Ralph Baum, Modernage Photo Service. and Milt Frier, Leitz, Inc.

● A four-day conference on photo-journalism will be held at the George Eastman House, Rochester, N.Y., Nov. 2-5. Co-sponsored by George Eastman House and the American Society of Magazine Photographers, the seminar will discuss all phases of

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photo-journalism, including company publications. . . . then in December comes the fourth international Visual Communications Congress (Society of Reproduction Engineers) in Chicago, Dec. 3-6.

● *Names that Make News:* **Earl G. Stanton,** manager of the Photo Department at Bell Aerosystems Co., and **James E. Hampson,** chief of the Photo Section of the Arkansas Fuel and Oil Company, have been honored

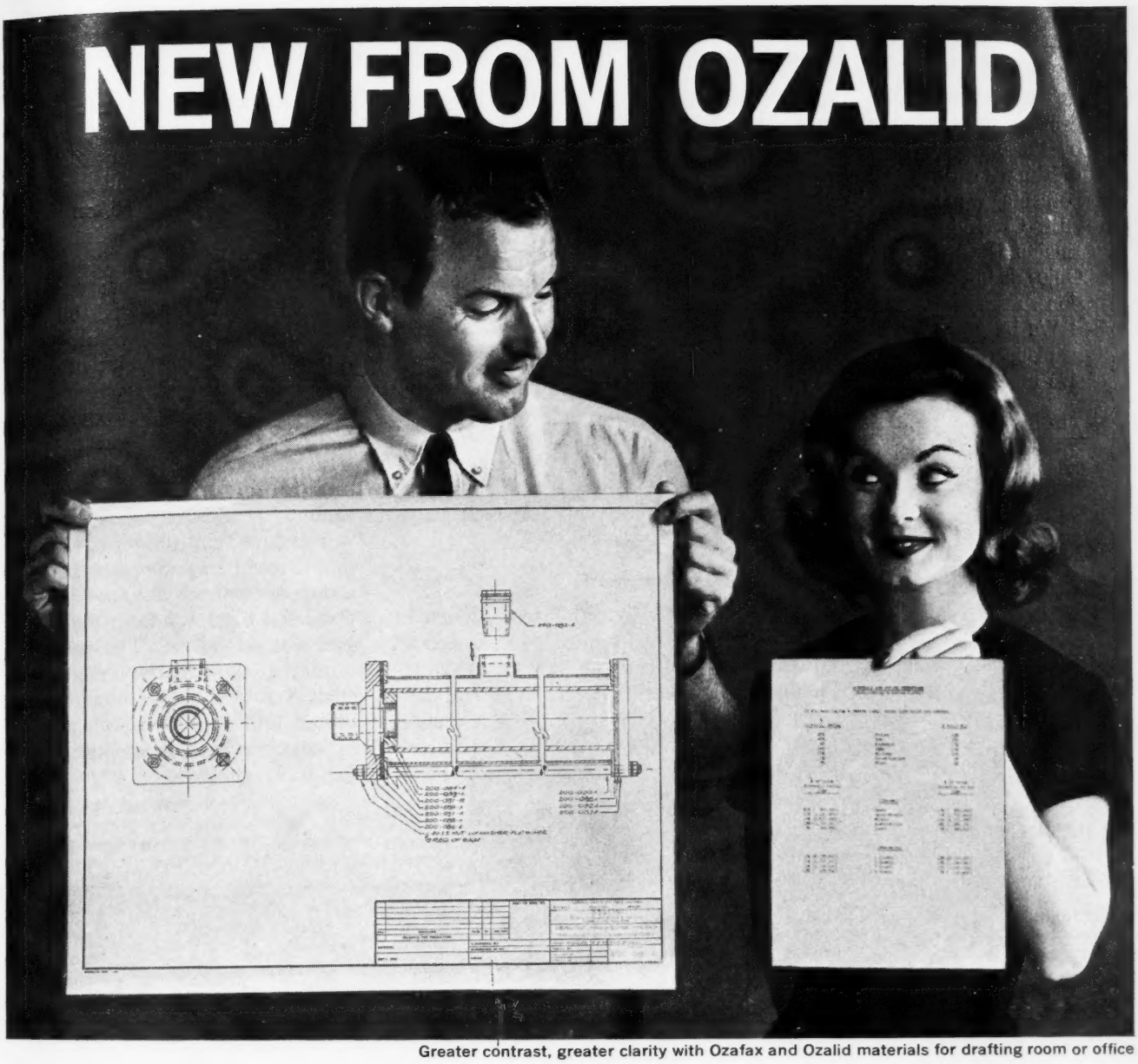
Jim Hampson

Earl Stanton

by their fellow industrial photographers. Both have been elected industrial directors of the PP of A and will serve through 1961 . . . **Harvey Marks,** Visual Aid Center, Denver, has been elected president of the National Audio-Visual Association . . . the Society of Motion Picture and Television Engineers has named **Dr. Hubert Schardin,** director of the German-French Research Institute, as the first recipient of the newly established E. I. du Pont award. The award is given to Dr. Schardin for his world-renowned research in ballistic photography and his contributions to the Cranz-Schardin system of high-speed photography.

● Recent organizational meetings have covered a wide range of topics. *Mid-States Industrial Photographers* heard Bob Campbell, Chas. Beseler Company urge industrial photogs to become A-V experts. He cited the photo department as the rightful source for "production of transparencies, mechanical projectables, and polarized illusions of motion." . . . Antique motion picture equipment was the subject of a presentation by Don Malkames to the *N.Y. chapter SMPTE . . . Midwest Industrial Photographers* were briefed on "What You Can Expect from a Color Lab".

NEW FROM OZALID



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The greatest progress in photodrawing has naturally been made by those organizations in which drafting is a particularly high percentage of total engineering cost. General Electric's Large Jet Engine Department in Evendale, Ohio, is among such organizations.

We began to use photography in place of complex and expensive multiple line drawings of jet engine assemblies back in 1951. Although the exterior casing of jet engines has since become far less cluttered, an end view was then a mass of clamps, hoses, wiring and other equipment. Draftsmen commonly, and understandably, referred to this view as the "snake pit" or "bowl of spaghetti." The many side-view drawings that were necessary for each variation of a basic jet-engine assembly presented equally formidable tasks.

Today, virtually all engine assembly drawings in the Large Jet Engine Department are done photographically, providing clearer information in fewer views on a great deal less paper. The overall cost of these assembly photodrawings is less than five per cent of equivalent line drawings.

Four different approaches to photodrawings were attempted before the technique now being used was established. A chronology of those approaches may be of help to others who are interested in evolving a photodrawing technique suitable to their particular operation.

First Approach

In 1951 our first approach in using photodrawings consisted of 8 x 10 photo inserts, with accompanying leader lines and call-outs, on a 48- x 34-inch section of an ungainly 34- x 120-inch standard drawing sheet. These photo inserts, which varied in number from eight to 20, were primarily closeups or detail photos, while the overall engine exterior was reproduced on the remaining space of the drawing sheet in line drawings.

All photographs were taken from a camera mounted on a high monorail that curved around the two ends and one side of the prototype engine. By marking the monorail position and providing a position key on the print, the camera could be placed in the same positions, over and over again. In addition, the engine was mounted on rollover rings so that it could be photographed. A series of uniform camera locations and distances from the engine was established. This procedure was particularly important whenever a design revision required that a photo be replaced by another shot from precisely the same position.

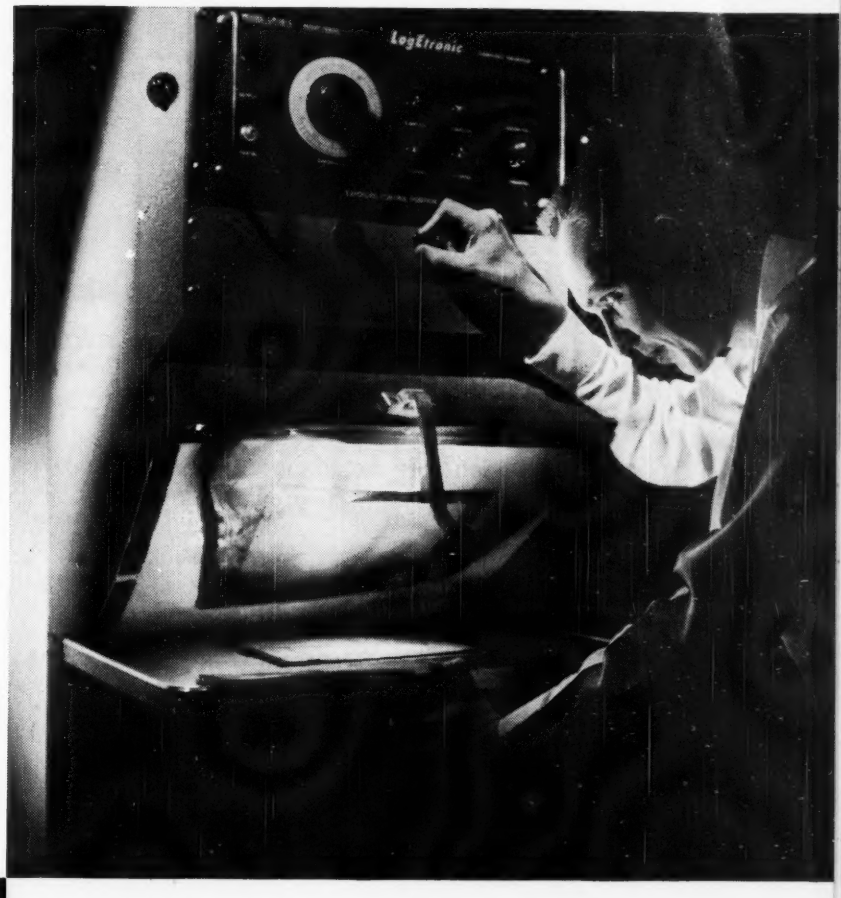
G.E. EVENDALE'S single-sheet photodrawing approach makes it possible to put all photos and call-outs for a given engine on a 34- x 44-inch (size E) standard vellum sheet. Evendale started experimenting with photodrawing back in 1951.

The original negatives were converted to 133-line positive screen films in a standard contact printer. The screen positives were then stripped into the allotted spaces on the vellum drafting paper. The dot structure in the positive screen made it possible to obtain good diazo-type prints without the need for reproducing intermediate tones.

There were three faults in this original method. First, although the photo inserts certainly replaced a large number of detail drawings, there was still a great deal of line work to be done. Second, a sheet size of 34 x 120 inches, although common in drafting practice, is not convenient to use out on a production line or in the field. The third and most important fault, which was primarily responsible for changing the photodrawing method, was that detail reproduction in

continued on page 75

CONTRAST CONTROL is obtained automatically in a LogEtronic contact printer.



ENGINE IS PHOTOGRAPHED. Camera is now positioned by measurement or floor markings rather than being mounted on a monorail as in Evendale's first approach.

DRAWING WITH LIGHT

G.E. draftsmen no longer painstakingly sketch "snake pit" views of jet engines. Photodrawings lighten their load.

by THOMAS E. WARE

Xerography at Arma Hits the Mark

Bosch Arma, manufacturer of tiny missile parts, thinks big when it comes to reproducing drawings of these assemblies.

The Arma Division of the American Bosch Arma Corporation is in the business of manufacturing tiny but complex guidances systems for missiles. Naturally, hundreds of drawings are used daily in such high-level engineering work. Specifically, Arma draftsmen turn out new engineering drawings at the rate of 500 a week, and for each new drawing, 35 copies are required. Drawing-change notices average another 250 a week, and 35 copies of each are required.

Crushingly Costly

An operation of this size and scope can be crushingly costly if all possible economies are not observed. Well aware of this fact, those responsible for cost-improvement at Arma have followed closely developments in the engineering reproduction field, and from their observations came the decision to build a new engineering reproduction procedure around xerography. A company audit reveals that they made a right decision. Arma figures to save $82,000 a year in just this one area of operation.

Procedure

Upon completion of a new original drawing or a changed drawing, it is forwarded to the Reproduction Section of the Product Design Department, where the drawing is immediately "xeroxed" to furnish an adequate supply of prints for initial distribution.

The drawing is photographed on a sensitized xerox plate by a Robertson copying camera. Haloid Xerox provided a xerox backplate adapter, which easily converted the existing Robertson to xerography. Moreover, by substituting a filmholder for the adapter, the camera can be used for normal film copying work. Thus, the camera now has a dual capability.

One operator is stationed outside the darkroom. He places the drawing in the copying frame. A second operator, inside the darkroom, charges the plates and makes the actual exposure. He passes the exposed, developed plates through the darkroom pass box to the first operator. The latter transfers the image to an offset matte.

Printing the Matte

A third operator, who runs an Addressograph-Multigraph No. 2066 machine, prints the offset matte. With this machine, the operator has the option of cutting 12″ x 18″ paper in half during the printing cycle. Thus, in the case of drawings on "A" and "B" size formats, engineering and proposal sketches on 8½ x 11

INSIDE DARKROOM, operator charges surface of xerox plate.

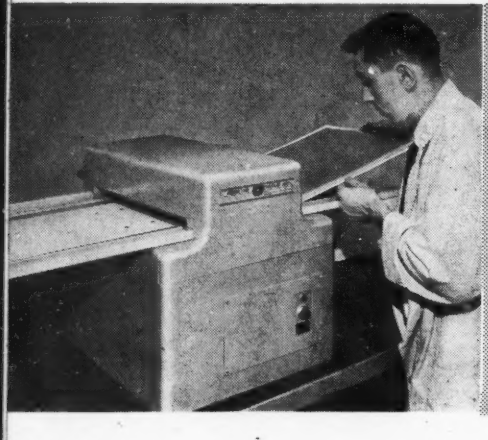
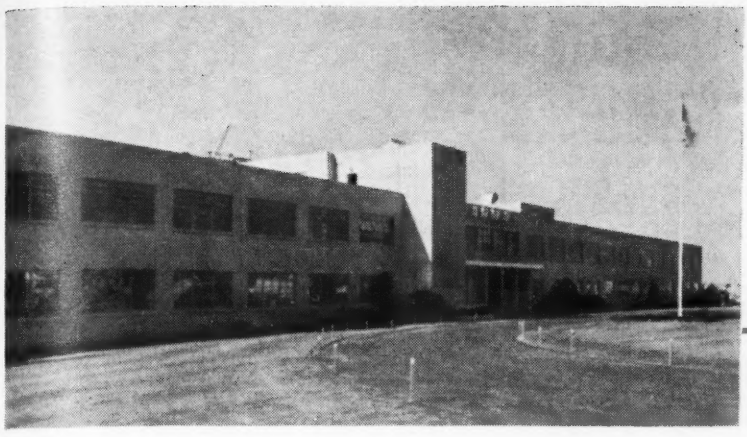


PLATE is then put into focal plane of Xerox 1218 camera which protrudes through darkroom wall.

OPERATOR adjusts diaphragm after mounting drawing on copyboard.



ARMA DIV., American Bosch Arma Corp., is located in Garden City, N.Y. The firm makes electronic missile parts.

paper, and other work on 8½ x 11 paper, two drawings can be printed and cut simultaneously.

The Addressograph-Multigraph No. 2066 machine prints on 12″ x 18″ paper from 15½″ x 20″ pin-bar punched offset paper mattes. On the 12″ x 18″ paper, a "C" size drawing reduces to approximately a ¾ size print, while a "D" size drawing reduces to approximately half size. The punched offset paper mattes are the least expensive variety; they have been found quite adequate for this purpose.

With the adoption of xerography, it became apparent that Arma should standardize on drawing sizes. Having a wide variety of sizes, the operator lost valuable time in changing the camera reduction ratio to accommodate each size. Moreover, on extremely large (roll size) drawings, xerography could not be used. As a result, all drawings originated by the Design and Drafting Section are prepared on "C" or "D" size formats. Drawings previously roll size are prepared on multiple "D" size formats and each "D" size is sheet numbered clearly.

Four Operators Required

At the initial installation of the Haloid Xerox equipment, four operators were required to perform the xerography cycle. However, as personnel of the Reproduction Section became familiar with the equipment, the present team of three operators was found capable of doing the work.

For Security Reasons

Immediately after a drawing is xeroxed, it is microfilmed for security reasons before it is filed in the Central Data File adjacent to the Reproduction Section.

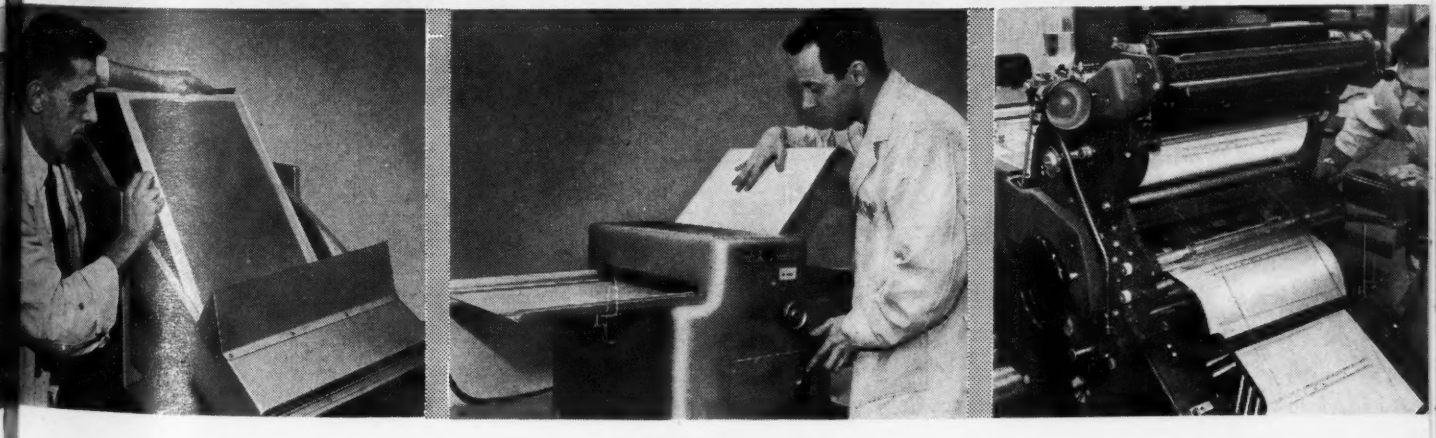
Benefits other than financial have also been realized by Arma as a result of using xerography. Because of the new low cost of reproduction, Arma was able to set up a handy engineering-drawing library. This is a section of pigeon-hole shelves containing multiple copies of drawings commonly used. The prints are run off in advance of actual need and are filed in the pigeon holes for self-service availability.

The prints are so inexpensive that engineers are encouraged to discard them after use rather than refile them. This arrangement is known as a stock-print system, and it eliminates, besides refiling, written requisitions and delivery, file clerks and, to a great extent, special reproduction requests. □

CHARGED POWDER adheres to areas shielded from light.

POWDER IMAGE on Xerox plate is transferred to offset paper master, then fused by heat.

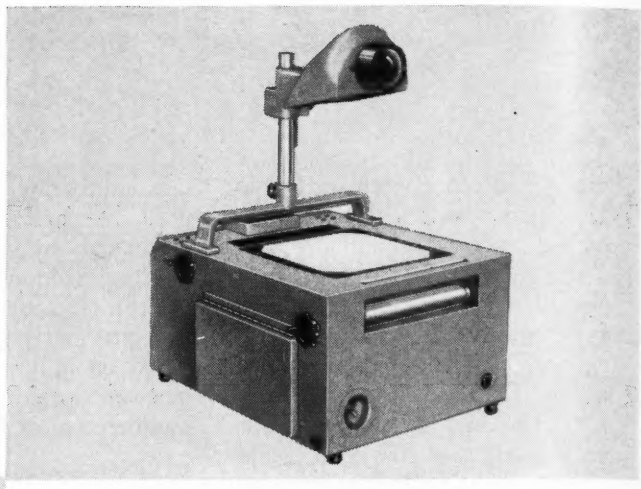
OFFSET paper master is mounted on press for runoff of copies.

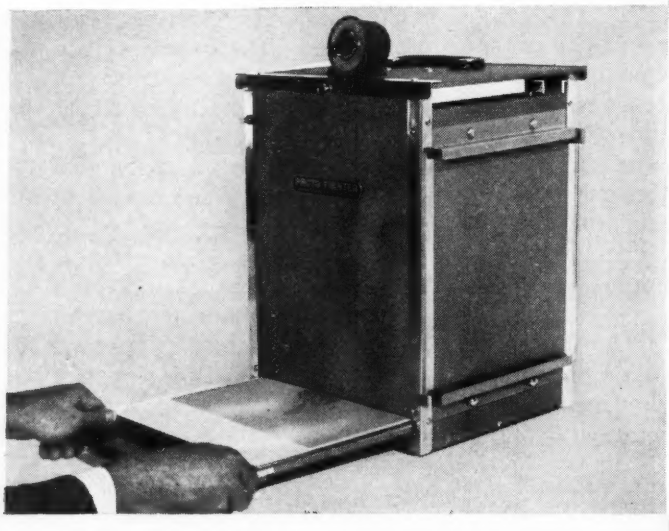


Team-mates!

TRANSPAQUE JR. PROJECTOR

A new "overhead" projector which produces a **bright** image in a **fully-lighted** room . . . the details of projectuals are sharp and easy to read . . . blacks are blacker . . . colors are bright and vivid . . . because the Transpaque Jr. projects **three** times as much light on the screen as conventional "overhead" projectors.





TECNIFAX SLIDEMASTER SYSTEM

Now anyone can design, print and mount his own multi-colored "overhead" projectuals with this inexpensive, integrated process . . . no special skills are required . . . simple techniques produce dramatic, colorful, professional-looking transparencies.

YOURS FOR THE ASKING!

Tecnifax Corporation is continuously developing, in its Visucom Laboratories, new and interesting techniques for using the overhead projector. Training in these techniques is available to you, without charge for materials, facilities or instruction, through the semi-annual Tecnifax Seminar-Workshops and the continuous Tecnifax Visucom Program. For information write to Department IP, Tecnifax Corporation, Holyoke, Massachusetts.

TECNIFAX
CORPORATION

Manufacturers of
Visual Communication
Materials
and
Equipment

HOLYOKE, MASSACHUSETTS

"It's Easy to do Business with Tecnifax"

Circle No. 618 on Post Card

DIRECTORY OF DIAZO PRODUCTS AND PRODUCERS

	BLUE-PRINT			WASH-OFF			BROWN-PRINT				
	Opaque Paper	Opaque Paper Plastic Coated	Opaque Cloth	Translucent Paper	Translucent Cloth	Transparent Film	Opaque Paper	Translucent Paper	Opaque Cloth	Translucent Cloth	Transparent Film
EAST Adelphi Research & Mfg.	X		X				X	X			
Azon Corp.											
Buffalo Blue Print	X	X	X	X	X		X	X	X	X	
Defiance Sales Corp.							X	X	X	X	X
Elliott, B. K.	X		X				X		X		
Keuffel & Esser	X	X	X	X	X	X	X	X	X	X	
Keystone Blue Paper Co.	X	X	X				X	X	X		
Ozalid Div., General Aniline											
Solar Products	X	X	X	X	X	X					
Speidel & Co.	X	X	X				X	X	X	X	
Tecnifax Corp.											
Weil, J. H.	X	X	X	X	X		X	X	X	X	
MIDWEST A-B Coaters											
Blue Print Paper Co.	X										
Bruning, Charles	X		X	X	X		X	X			X
Cole, H.	X										
Cushing & Co.	X										
Dietzgen, Eugene	X		X		X	X	X	X	X		X
Huey Co.	X		X				X	X	X		
K-C-B Co.	X						X	X			
Pease, C. F.	X						X				
Phomat Corp.											
Post, Frederick	X			X			X	X			X
Reproduction Products, Inc.	X	X									
Ridgway Co.	X	X	X	X	X	X	X	X	X	X	X
U.S. Blue Print Paper Co.	X										
Universal Blueprint Paper Co.	X		X				X	X	X		
Weber-Valentine	X		X				X	X			
WEST Azon West Coast Corp.											
Dieterich-Post	X		X				X	X	X		
Klingler, Fred E.											
R.B.P. Products	X						X				
Salt Lake Blue Print	X	X	X								
San Diego Reproduction Products	X										
CANADA Abso Blue Print	X	X	X								
Bielby & Davis, Ltd.											
Bruning, Charles				X	X	X	X				
Hughes-Owens Co., Ltd.	X		X				X	X			
Leask, George	X										
Martlin & Lawrie, Ltd.	X		X								
McKeown, J. A.	X										
Wade, Norman											

PRODUCERS	MOIST DIAZO								
	Diazo Papers Opaque Black	Diazo Papers Translucent Sepia	Diazo Papers Plastic-Coated	Diazocloth Opaque Black	Diazocloth Translucent Sepia	Diazofilm Transparent	Diazo Glass-Cloth	Diazofilms Dimensionally Stable Sepia	Reflex Materials
EAST Adelphi Research & Mfg.	X	X							
Azon Corp.	X	X	X	X	X	X		X	
Buffalo Blue Print									
Defiance Sales Corp.	X	X	X	X	X	X			
Elliott, B. K.	X	X	X						
Keuffel & Esser	X	X	X	X	X	X	X	X	
Keystone Blue Paper Co.	X	X	X						
Ozalid Div., General Aniline	X	X							
Solar Products	X	X							
Speidel & Co.	X	X							
Tecnifax Corp.	X	X	X	X	X		X	X	
Weil, J. H.	X	X	X	X	X				
MIDWEST A-B Coaters	X	X							
Blue Print Paper Co.	X	X							
Bruning, Charles	X	X	X	X	X	X	X	X	
Cole, H.	X								
Cushing & Co.	X	X							
Dietzgen, Eugene	X	X	X	X	X				
Huey Co.	X								
K-C-B Co.									
Pease, C. F.									
Phomat Corp.	X	X							
Post, Frederick	X								X
Reproduction Products, Inc.	X	X							
Ridgway Co.	X	X	X	X	X				
U.S. Blue Print Paper Co.									
Universal Blueprint Paper Co.	X	X		X	X				
Weber-Valentine	X	X							
WEST Azon West Coast Corp.	X	X				X			
Dieterich-Post	X	X							
Klingler, Fred E.									
R.B.P. Products	X	X							
Salt Lake Blue Print									
San Diego Reproducton Products	X	X	X	X	X	X	X	X	X
CANADA Abso Blue Print	X	X		X	X				
Bielby & Davis, Ltd.	X	X	X						
Bruning, Charles	X	X		X	X	X		X	X
Hughes-Owens Co., Ltd.	X	X	X	X	X	X	X	X	X
Leask, George	X			X	X				
Martlin & Lawrie, Ltd.	X								
McKeown, J. A.	X	X		X					
Wade, Norman	X	X		X					

DRY DIAZO

Diazo Papers Opaque	Diazo Papers Translucent	Diazo Papers Plastic-Coated	Diazocloth Opaque	Diazocloth Translucent	Diazofilms Reproducible	Diazofilms Projection	Diazofilms Process	Diazo Microfilm	Diazo Glass Cloth	Diazofilms Dimensionally Stable	Diazoplastic Opaque	Sensitized Scribe Materials	PRODUCERS
X	X												Adelphi Research & Mfg. EAST
X	X	X	X	X	X					X			Azon Corp.
													Buffalo Blue Print
X	X		X	X									Defiance Sales Corp.
X	X	X	X		X					X			Elliott, B. K.
												X	Keuffel & Esser
X	X	X											Keystone Blue Paper Co.
X	X	X	X	X	X	X	X		X	X			Ozalid Div., General Aniline
X		X		X					X	X			Solar Products
X	X		X	X									Speidel & Co.
X	X	X	X	X	X	X	X	X		X	X	X	Tecnifax Corp.
X	X	X	X										Weil, J. H.
X	X												A-B Coaters MIDWEST
X	X												Blue Print Paper Co.
X	X		X										Bruning, Charles
X													Cole, H.
X	X												Cushing & Co.
X	X	X	X	X	X				X	X		X	Dietzgen, Eugene
X	X												Huey Co.
													K-C-B Co.
X	X	X											Pease, C. F.
X	X												Phomat Corp.
X			X	X	X	X		X		X		X	Post, Frederick
X	X	X											Reproduction Products, Inc.
X	X	X	X	X	X					X			Ridgway Co.
													U.S. Blue Print Paper Co.
X	X		X										Universal Blueprint Paper Co.
X	X		X	X									Weber-Valentine
X	X												Azon West Coast Corp. WEST
X	X												Dieterich-Post
X	X												Klingler, Fred E.
X	X	X											R.B.P. Products
													Salt Lake Blue Print
													San Diego Reproduction Products
X	X	X	X										Abso Blue Print CANADA
X	X	X											Bielby & Davis, Ltd.
X	X												Bruning, Charles
												X	Hughes-Owens Co., Ltd.
X	X	X	X	X	X					X			Leask, George
X		X	X										Martlin & Lawre, Ltd.
X	X		X										McKeown, J. A.
X	X	X	X	X	X					X			Wade, Norman

WONDER FILM has been purposely snarled in white print machine to test durability. It came out unharmed.

Double-Duty Film Cuts Out Re-draws

New "wash-and-wear" medium is expected to save $$ for Raytheon and insure print quality.

by WILLIAM N. BAHRIKIS
Drafting Section Head
Missile Systems Division
Raytheon Company

For a while now we in the Product Design Branch have been wearing grins like the one that must have graced the face of Isaac Newton after the fall of that famous apple. By using an amazingly simple technique of restoration, first made possible only a few months ago, we expect to save thousands of dollars annually in the cost of "re-draws" of our engineering drawings.

The technique is simply this: when our drawings build up layers of grime and soil to the point where they are no longer printable, we simply wash them off with soap and water, and they are as good as new.

Why, you ask, wasn't this simple and seemingly obvious technique thought of sooner? Well, it was thought of. But before it could be employed, two essential product developments were needed: (1) a completely washable drafting medium, and (2) a completely washable pencil line.

Almost miraculously, both of these developments came upon the scene at about the same time. The washable drafting medium is Herculene Drafting Film, manufactured by the Keuffel & Esser Company; the washable pencil line is provided by a pencil tradenamed Duraler, which deposits a plastic rather than a graphite line.

We did not discover these products by chance. A Drafting Practices Committee was established by Raytheon's Missile Systems Division in 1958. One of its primary duties was to do something about the staggering expense the company was incurring each year in the restoration of engineering drawings.

This situation was brought about because our drawings — on conventional tracing paper and tracing cloth — were subjected to extended revision, handling and filing. The build-up of surface dirt was rapid. In some instances, a drawing would become too soiled and abused in three months to produce a readable print.

Via the trade "grapevine," the committee heard that a major East Coast aircraft firm was ex-

continued on page 51

WASHING, followed by rinse, restores Herculene film to original clarity.

Miniaturization Report No. 1

What price automation?

In view of today's rising costs, the need for automation in the processing of engineering drawings is recognized as necessary. However, in the welter of claims and counterclaims for various miniaturization processes, a good deal of confusion has arisen around the relative merits of the 35mm and 105mm systems.

These facts need stating: Automation should not dictate film size; conversely, film size should not dictate whether or not automation is possible.

To clarify these points: One should not necessarily install a 35mm system on the assumption that it is the sole answer to high speed automated reproduction. To do this is to overlook the fact that the 105mm system is also capable of automation. And 105mm can often be automated without the expenditure of large sums of money for new processing equipment.

Both systems—35mm and 105mm—have their place in the modern engineering reproduction department. (The K&E MICRO-MASTER® Camera-Projector takes and projects *both* film sizes.) However, if automation is the only basic consideration, the case for 105mm needs further emphasis.

For example: 35mm aperture cards for information retrieval are designed to deliver negatives quickly and automatically. General practice, however, is to key-punch both the aperture card and a companion "tracer" card to prevent excessive negative wear in sorting. Selection of the aperture card is manual. (Tracer cards also provide 23 additional key-punch positions.)

Tracer cards can also be successfully used with a 105mm system. And only one card need be punched. Selection of negatives, as with aperture cards, is manual.

From start to finish, let's see how the two systems compare:

35mm	105mm
• Negatives in aperture cards • Punch-card retrieval • Automatic "dry-process" reproduction	• Negatives in archival envelopes • Punch-card retrieval • Standard diazo reproduction
PREPARATION AND FILING	
Original drawing photographed to yield master negative	Same
Tracer card key-punched	Same
Aperture card key-punched, negative inserted in card	Archival envelope machine numbered, negative inserted
Tracer cards and negatives filed	Same
SEARCH AND DELIVERY	
Tracer card sorted to find location of negative	Same
Negative selected manually from file	Same
REPRODUCTION	
Distribution prints made from negatives on automatic "dry-process" printer at rate of 20 ft. per minute.	Prints made from photographic intermediates on diazo machines at 60 ft. per minute. (Time spent in preparing intermediate offset by faster print speed of diazo.)

SUMMARY:

- Despite minor differences in procedure, preparation and filing take almost equal time (a matter of minutes).
- Search and delivery take exactly the same time.
- In production, printing speed using 105mm negative and standard diazo is *as fast* as automatic "dry-process", or *faster*.
- In short: both systems offer roughly equal speed and convenience.

Undoubtedly, if you are at all involved in engineering reproduction, you will require more facts than could be furnished in this brief message. We have them—complete with cost comparisons—and will be pleased to furnish them if you will return the coupon below.

KEUFFEL & ESSER CO.
NEW YORK • HOBOKEN, N. J. • DETROIT • CHICAGO
MILWAUKEE • ST. LOUIS • DALLAS • DENVER
SAN FRANCISCO • LOS ANGELES • SEATTLE • MONTREAL

KEUFFEL & ESSER CO., Dept. IP-10, Hoboken, N. J.

☐ Please send information on the 105/35mm Micro-Master system.

☐ Please have a K&E representative call.

Name & Title_____

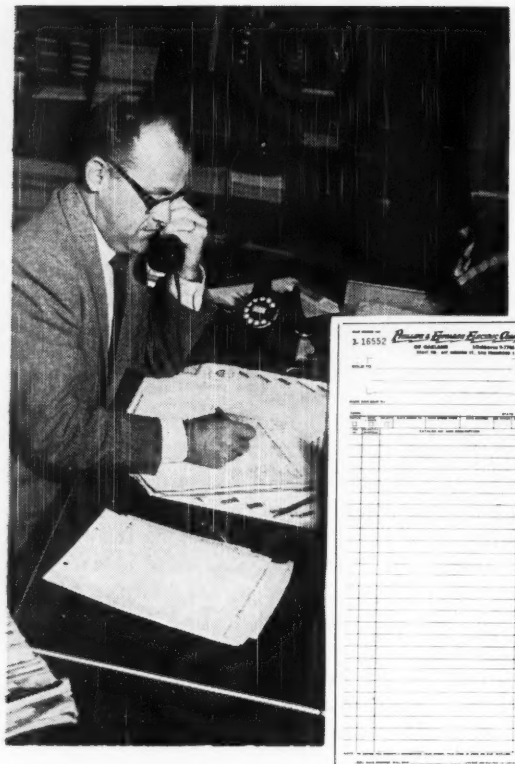
Company & Address_____

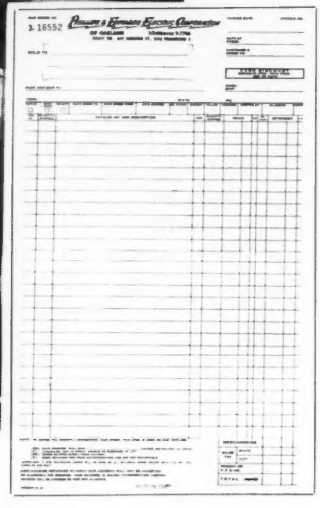
1544

Circle No. 562 on Post Card

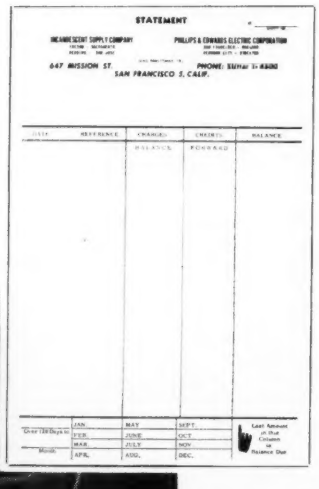
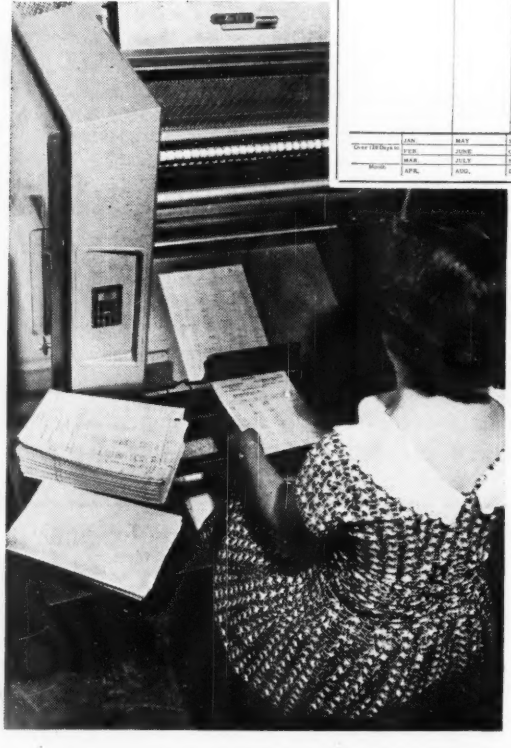
Diazo Speeds Order Invoices

ISCO "mother-hens" 10 electrical distributors and offers them an efficient accounts receivable system.





PHONE ORDERS are written directly on the 6-part order forms. Forms use invoice that is copied for distribution on diazo machine.



BILLING is on translucent forms. 7,000 of these are made each month on Bruning Copyflex copying machines.

by JAMES HUGHES

Executive Editor

The Incandescent Supply Company is a management firm responsible for the operations of 10 electrical supply distributors in Northern California. A recently constituted order-invoicing technique, which makes the most of diazotype reproduction capabilities, is a good example of the efficient methods that Incandescent employs on behalf of the distributors.

Incandescent uses a six-part order form, consisting of a posting copy, customer's invoice, duplicate invoice, file copy, salesman's copy and packing slip. The customer's invoice is printed on translucent stock to facilitate diazotype reproduction.

The distributors receive orders written on various forms by salesmen in the field and customers. The order information is transcribed onto the six-part form. Phone orders are copied directly onto a similar form.

Next, a credit check is made. This is followed by checking a Kardex file to make sure that the inventory necessary to fill the order is on hand. At this point, items to be shipped are subtracted from the Kardex record so that there is a running control on all inventory.

Then the entire six-part form goes to the shipping department, where quantity shipped, items shipped and means of shipment are indicated on the six-part forms. The packing slip is detached by the shipping department and sent with the merchandise to the customer.

Following shipment, the remaining five forms are returned to the individual office. There, back

orders are filled. Then, the forms go to a price clerk, where items are priced. A comptometer operator extends and totals.

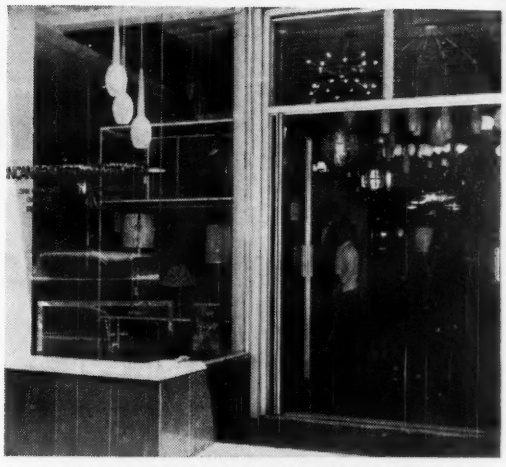
The billing department checks all figures and separates various sheets of the six-part form. The posting copy goes to the management company, where it is posted to accounts receivable.

The invoice is sent to the operator of a Bruning Copyflex diazotype copying machine. The operator uses the machine to reproduce the invoice in sufficient number for distribution. Usually, two copies of the original invoice are made, with additional copies depending on customer needs.

The translucent invoice original is placed face-up on a sheet of sensitized Copyflex paper. Both sheets are fed into the machine together. They are held automatically in close contact inside the machine as they travel around a glass cylinder that houses a light source. Ultra-violet light rays shine through the cylinder to deactivate the diazo coating on the Copyflex paper wherever the light is not blocked by opaque marking on the original invoice.

The original is returned to the operator, and the exposed Copyflex sheet passes through rolls that apply a thin film of developer. This developer converts the diazo coating remaining on the paper into sharp black images.

Seconds after insertion, the machine delivers a flat, dry, black-line copy of the invoice. Additional copies can be made without loss of sharpness or image density.



ATTRACTIVE INCANDESCENT SUPPLY COMPANY store in San Francisco is part of firm's retailing setup.

OPERATOR copies statements with Copyflex machine. Process does not require stencils or paper masters.

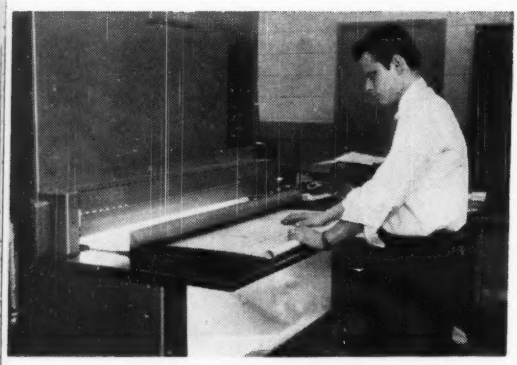
The file copy of the six-part form is sent to an alphabetical file for permanent record of the shipment and sale. The salesman's copy is mailed to the salesman to inform him that the order has been shipped and to give him sales prices and other necessary information.

The posting copy is sent to the management company accounts receivable department. At the management company, the information is posted to the customer ledger.

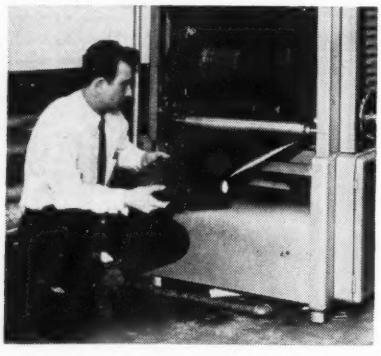
Since the management company is the accounting center for all the operating companies, accounts of all order invoices are payable to Incandescent. Although invoices are sent out along with each customer order shipped, customers do not pay the bills until they receive an end-of-the-month statement from the management firm.

The statement carries a list of all orders shipped during a given month and includes a billing for unpaid previous orders. The statement serves as a complete record of each account - - showing all charges and credits. This single sheet statement is printed on a translucent sheet. Posting is done automatically on an Underwood-Sundstrand Posting Machine.

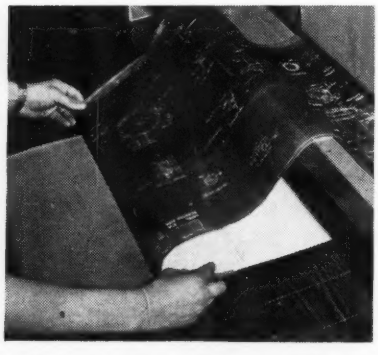
When the statement is completed, two copies are made on a Copyflex machine; one for the customer and one for the operating company. The original statement remains in the accounts receivable department for additional future posting. Over 7,000 copies of these statements are run each month. □



STEP I: Originals are reduced on Revolute Continuous Printer, then copied.



STEP II: Revolute Processor develops rolls coming from printer.



STEP III: Reduced negs are copied on Revolute M4 blueprint machine.

STEP IV: Finished product appears with no vital information lost.

Half-size Copies Cut Red Tape in Half

"Retrievable Miniaturization" at Republic means lower costs for engineering drawings plus cutting of volume.

"Retrievable Miniaturization" has substantially cut reproduction paper costs at the Republic Aviation Corporation in Farmingdale, N.Y. The savings are expected eventually to reach $75,000 annually.

Retrievable Miniaturization is the name that the Paragon-Revolute Division of the Charles Bruning Company has given to its technique for reducing engineering drawings. The drawings are reduced to half-size photographic negatives by means of a high-speed Revolute Continuous Reducing Printer.

At Republic once a half-size intermediate is made, the master drawing has served its purpose. It is sent to a storage vault to await revisions. The negatives are used as "intermediate" masters for making copies on a Model M4 Paragon-Revolute blueprint machine. After copies have been made for current distribution, the negative is stored in a reproducible materials vault, from which it is taken whenever it is necessary to make additional copies.

When a master tracing is revised, a new negative is made and takes the place of the original negative in the reproducible materials vault. The obsolete negative is not discarded. It is stored in an "obsolete vault," where it remains on file as a permanent record of engineering changes.

"We're retaining high quality reproduction with our new system," said Joseph Strada, Group Head of the Engineering Reproduction Section at Republic. "In fact, there have been some instances where the reducing printer negatives have been an improvement over the originals because of the nature of the photographic process. This has to some extent reduced the necessity to redraw originals which fall into this category."

Republic manufactures the Mach 2 all-weather F-105D Thunderchief fighter-bomber for the Air Force and has programs in the advanced missile and spacecraft fields. Its blueprint reproduction volume totals about 180,000 square feet weekly. The bulk of the negative intermediates necessary to produce this volume are made on the Revolute reducing printer. Reduced items include all types of release drawings for internal and external distribution, as well as cycle-graph charts made up by Republic's industrial engineering department. The charts may be as long as 40 feet before reduction.

"We set our camera for half-size reproduction, and set the speed control for a rate of 15 feet per minute," Mr. Strada said. "It delivers exposed negative paper. We develop the negative paper in our Revolute Continuous Photographic Processor,

continued on page 51

The Reproduction Machine That Goes Beyond The Call of Duty!

Starting with the Comet's **Micro-Start Button,** the operator finds an array of conveniences right at the finger-tips.

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Paragon-Revolute Advertising Department, Dept. P10-PA
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☐ Please send me more information about the Comet.

☐ Please arrange for your representative to contact me about a demonstration.

Name_____ **Title**_____

Company_____

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City_____ **County**_____ **State**_____

Circle No. 600 on Post Card

OUT-SIZED drying drum is feature of the Collins-Peerless Neoflow Reducing Camera at Vertol. Exposed paper in the magazine enters processor, runs through developing tanks, then is dried.

Copies By The Carload

are easily produced by this helicopter firm thanks to a copy camera which handles originals on a continuous basis.

by **LEO J. HODGSON**
Supervisor of Reproduction
Vertol Aircraft Corporation

Vertol Aircraft Corp., of Morton, Pa., is one of the largest independent manufacturers of helicopters in the world, with nearly 4000 skilled employees and almost a million square feet of plant space. The company is constantly being called on by government and industry to submit specific proposals and descriptive brochures.

Such presentations, normally 8½ x 11 inches in size, are composed of printed text and single-page or accordion-folded large-size drawings of components and sub-assemblies of our helicopter models. Since we may release as many as 25 presentations a year, each of which may run to as many as 100 copies, many thousands of drawings are required.

The time and money spent in preparing these copies has been substantially reduced through the application of photocopying to industrial reproduction. With the addition of a Peerless Neoflow camera, these large-size drawings can be photocopied, even at as great a reduction as 6:1, to provide legible prints in sharp black-and-white, no matter what medium has been used for the original drawing.

Reductions can be made on an intermittent or continuous-flow basis, at any one of six ratios, from 2:1 to 6:1. With this great flexibility, any of our drawings, which run from 17 x 22 to 42 x 144, can easily be scaled down to 11 inches in width and accordion-folded to 8½ in length.

The procedure used in making reduced photocopies for the 8½ x 11 presentations requires two steps. First, we make a contact negative of the full-size drawing on lith-type paper. Then, if necessary, we place on this negative a new drawing title-block which will print from the negative, leveling out the contrast between the old title and the body of the drawing.

We also place on the negative a legend indicating the scale of reduction used. This will also print from the negative.

The next step is to make the positive prints for the 8½ x 11 presentation. This is done by passing the full-size contact negatives through the Neoflow camera, obtaining reduced-size positives on a continuous strip of photocopy paper.

The larger drawings result in prints that are held to 11 inches wide but may be considerably longer than 8½ inches. In these cases the prints are accordion-folded to 8½ x 11.

Thus, we get photocopies in black-and-white that are comparable in density with the offset text. We are able to do the copying on our own schedule, with our own personnel and on our own premises. We can keep classified and sometimes irreplaceable drawings in the hands of our own people and we can also make last-minute corrections easily. The whole process is continuous, since we can print as many copies as it is possible to get on a single roll of paper.

The savings realized on just one presentation has amounted to $8,707.22. Sixty-three drawings had to be reduced and a total of 2,575 copies made. The estimate for outside preparation was $10,884.75; Vertol Aircraft prepared it for $2,177.53. In 19 months we have saved enough on reproduction costs to pay for the machine. □

K+E

HELIOS® NEWS

Government Approves New Diazo Interfileable

Government contract work no longer requires brownprint intermediates for interfiling. A newly perfected diazo coating, just approved by the Department of Defense, allows both working drawings *and* intermediates to be produced by the normal diazo process.

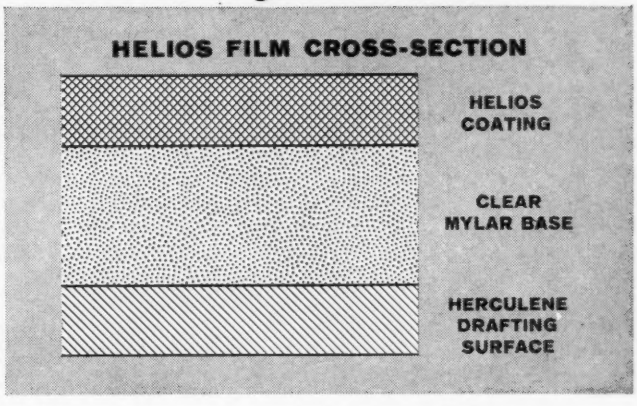
For many companies, this eliminates the necessity of sending drawings out for intermediates. At no increase in cost (and a *great* increase in convenience) they can be produced in-plant on their own diazo machines.

Formerly, diazo intermediates had been excluded from specs because the diazo coatings tended to "fade out" brownprints when they were filed together. The new diazo coating has little or no effect on brownprint.

Now, Military Spec. MIL-P-9853 for federal agencies and prime contractors allows the use of diazo products as interfileable intermediates.

The new diazo coating is available in HELIOS Interfileable Sepia Paper (499) from Keuffel & Esser. Just fill out and mail the coupon below for samples of this government-approved diazo interfileable.

New Helios Film Has Polyester Base



Keuffel & Esser Co. has a new HELIOS® Polyester Base Film which combines the engineered drafting surface and stable base of HERCULENE® Drafting Film with the HELIOS dry diazo coating.

As an intermediate drafting medium, particularly where revisions are required, this hard-to-beat combination offers a multitude of advantages to draftsmen and reproduction departments:

1. Unmatched drafting surface of HERCULENE for superior pencil, ink and typing acceptance.
2. Greater strength, durability and dimensional stability than acetate film or cloth.
3. Effortless mechanical erasure of image lines on the sensitized surface.
4. Unsurpassed covering power and background clarity.

New HELIOS is available in either black-line (517K) or sepia (517). It has undergone exhaustive field tests and results were enthusiastically favorable. For working-size samples – to test new HELIOS yourself – simply fill out and mail the coupon below.

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Please send me samples of HELIOS Interfileable Sepia Paper and HELIOS Polyester Base Film.

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Company & Address_____

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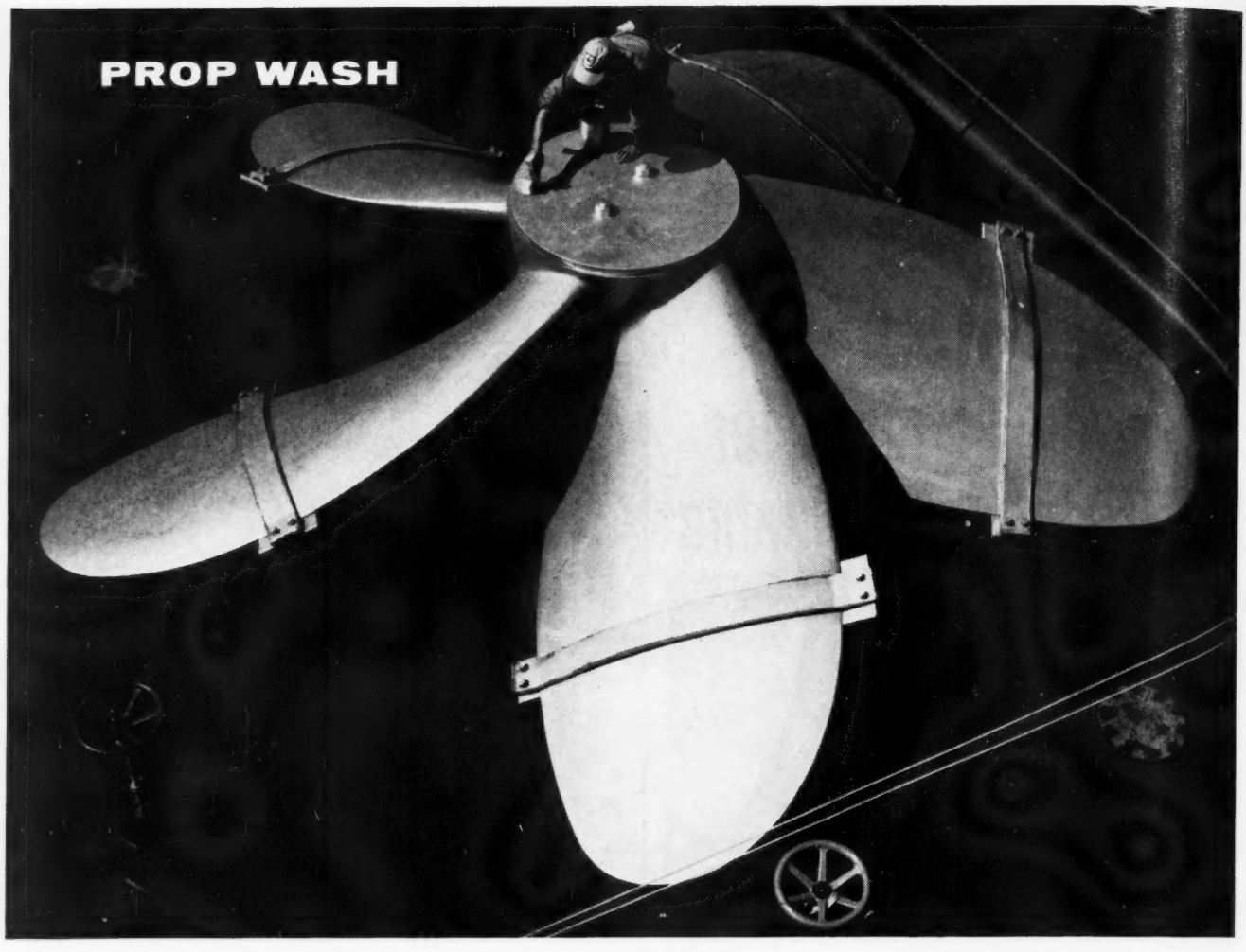

Industrial photographs come to life on HALOID® Photographic Papers

Industrial photography has emerged in the last several years as one of the most important functions of any industrial organization. Similarly, the need for detailed, long-lasting prints has grown. Try some of the best photographic papers in the business . . . including: *Varaloid®*, an excellent variable contrast paper most often used for commercial enlarging; *Halobrome®*, a high grade projection paper; *Halex®*, a contact paper especially suited for industrial photography and photo finishing; *Industro®*, a contact paper much in demand for commercial and portrait work. Write:
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From 1957 Graflex Photo Contest—Michael Anguti, New York City

HALOID XEROX®

Circle No. 544 on Post Card

SUPERIMPOSED diazo film and roentgenogram are inserted into Ozamatic dry diazo machine for initial exposing cycle.

Diazo For The Doctor

Medics now use diazo techniques for sharp duplicates of roentgenograms.

Roentgenograms (photographs made with X rays) are valuable visual aids to medical education. However, because more often than not, several people want to view the films at the same time, there is usually a need for duplicates.

Until recently, however, the methods for duplicating roentgenograms have not been entirely satisfactory. The usual photographic processes require an intermediate negative; hence, two stages of wet processing. Solarization procedures can be utilized, but standardization of the procedure is difficult, and wet processing is still essential. Direct contact printing gives reversal of the image and, therefore, is not satisfactory for teaching purposes.

Dr. Fred J. Hodges, of the University of Michigan Medical Center, began experimenting with diazo methods of reproduction as far back as the early 1940's. Unfortunately, the sensitized diazo materials then available were not adequate to produce the needed diagnostic details. Further progress had to await a materials breakthrough.

The breakthrough did not come until recently, when a new development in the production of continuous tone diazo transparent material by the Ozalid Division of the General Aniline and Film Corporation led to further trial and final success in the reproduction of roentgenograms by the Medical Center in conjunction with the University's Photographic Service.

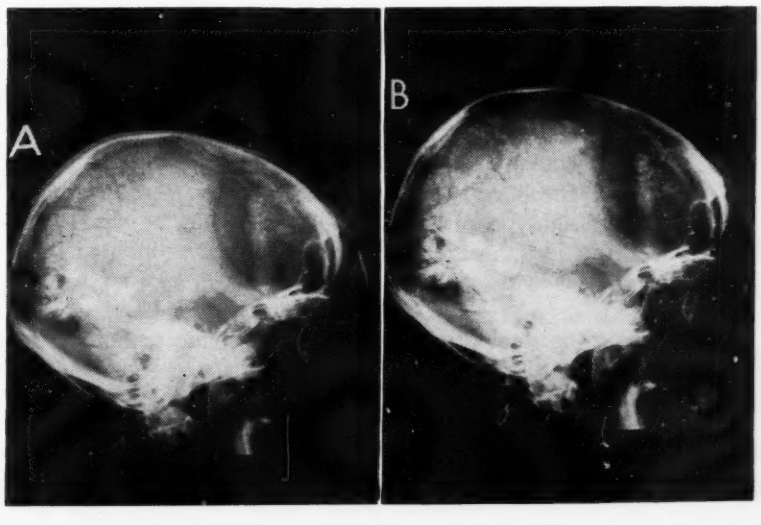
The Continuous Tone Film (Ozalid 111CTF) material is a doubly sensitized transparent base designed for continuous tone direct positive reproduction. A standard dry diazo machine is all that is needed for processing.

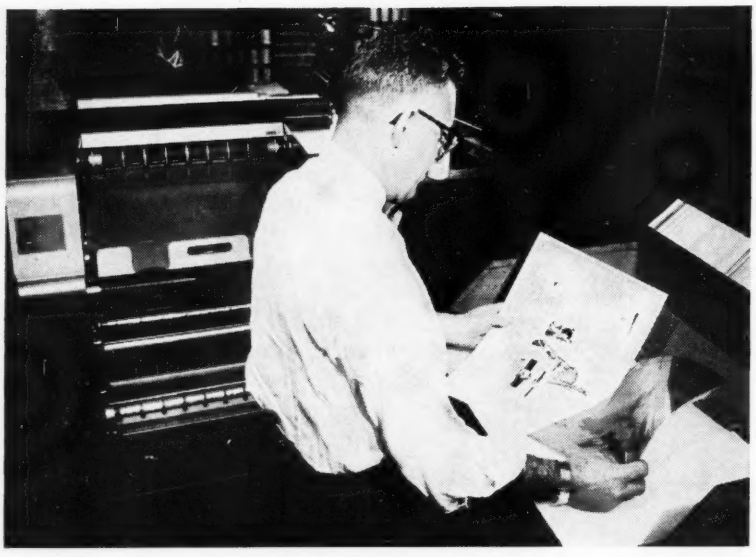
The process is carried out in a lighted room. The transparent sensitized material is placed in contact with the roentgenogram and the combination then placed in the roller system, which exposes it to ultra-violet light from a mercury vapor lamp. Different exposures can be achieved by varying the speed of the roller system, which is calibrated in speed of transport of film in feet per minute.

The exposed diazo sheet is then passed through the development cycle in ammonia vapor. The use of doubly sensitized material necessitates two passes through the development cycle, one for each surface of the sheet. The entire process, from the first handling of the roentgenogram to the production of a dry direct positive duplicate transparency, takes less than two minutes.

The resultant duplicate transparency demonstrates the continuous tone of the original roentgenogram with practically all of its initial detail. Detail is sufficient to maintain diagnostic quality. The major detectable differences in comparison to the original are the thinner and more flexible film base and the varying shades of blue in which the roentgenographic details are depicted. The duplicating process can be carried out repeatedly without harm to the original film. □

ORIGINAL roentgenogram (A), and final duplicate (B) placed side by side. Even enlargements from duplicate maintain all the diagnostic detail.





SUPERIMPOSED film positives are placed atop sheet of diazo copying paper and fed into a Bruning Copyflex machine. Seconds later a "proof" of both artwork and text is delivered.

Making Catalogs the Diazo Way

A Chicago type house uses the Brightype photo method with diazo and finds catalog paste-ups are a thing of the past.

Logan Square Typographers, a Chicago type supplier, has applied diazotype reproduction to its operations and reduced production time in proofing type for catalogs and other advertising material.

Customers send Logan Square film positives of art work to be used on catalog pages along with directions showing how copy is to be set and in register. Type is set by Monotype, Linotype and hand. The type is then made up into page form. The page is converted by the Brightype method into a photographic image.

Area Coated

In Brightype the total printing and non-printing area of a type form is cleaned and coated with a quick drying liquid lampblack. The coating is then removed from the printing surface only. After this treatment, the type form is basically a negative. The printing surface is reflective and the background is light absorbent.

Placed on Copyboard

The form is placed on a copy board, swung to a vertical position and photographed with a Brightype camera. The result is a positive image of the printing form which can be made either on paper or on film. For diazo "proofing," a film positive is prepared, and the typographer superimposes it on the client-supplied positive. The combined positives are copied on a Bruning Copyflex machine.

The copying technique is simple. The superimposed film positives, in perfect register, are placed face up atop a sheet of sensitized copy paper and fed into the machine together. The black-on-white copies that result are used as "proofs." If the client who sees a diazo "proof" wants to make changes, new type is set and another "proof" drawn by the same method.

Cuts Out Paste-up

This technique eliminates the time-consuming pasteup that was previously required in catalog pasteup. Such pasteups were made from set type and then photographed. Film positives were made and a "silverprint" sent to the customer. Any corrections necessitated additional pasteups, film positives and silverprints. Turning to diazo reproduction has eliminated all these time and money-wasting steps for Logan Square and enables them to offer faster, more economical customer service. □

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—Photomicrography
—Electron microscope printing

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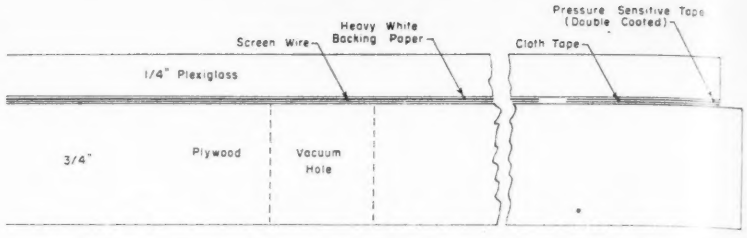
INP S-35

Circle No. 614 on Post Card



CROSS SECTION of small air volume do-it-yourself vacuum frame.

Jumbo-Sized Vacuum Frame

Here's a simple way to convert your table-top vacuum frame so it will take larger originals to be photographed.

R. P. GRAVESMILL
V. G. EIFERT
Shell Oil Co.

Many photographic labs would operate more smoothly if a vacuum frame of greater size than conventional table-top models was part of the installation. However, the company budget may not stretch to include money for a new vacuum frame, or the need might not be frequent enough to warrant the purchase.

This was the case at the Shell Oil Company camera room in Houston which is part of the geophysical section data processing group. Since ours was only a part time need, the problem was to convert what we had into a larger vacuum frame. Our equipment consisted of an 8x10 camera with a 10-inch Kodak Ektar wide field lens, a sturdy frame on which the camera and photographic board was mounted, and a conventional vacuum frame of 22x28-inch size.

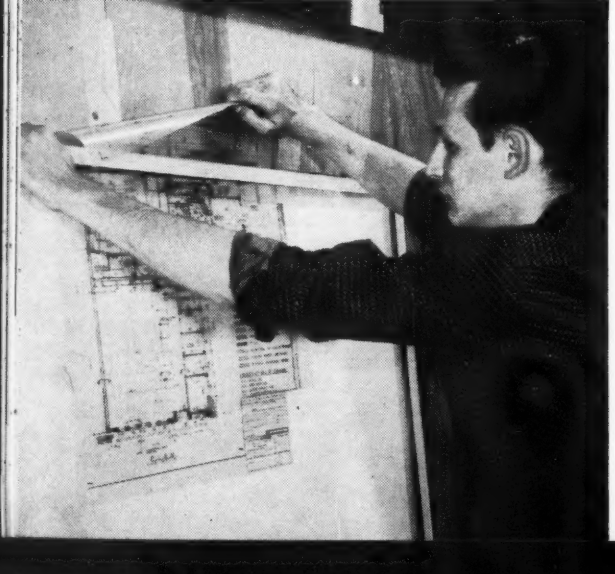
After a great deal of trial and error a very simple solution was found for developing a vacuum over about 20 square feet of surface using a relatively small volume vacuum pump. A 5/8-inch hole was drilled in the center of the back side of our camera board to which the vacuum pump was connected. A layer of screen wire with an area the size of the planned vacuum frame was placed over this hole on the front side of the board. On top of this was placed a layer of heavyweight white paper with pin holes every four inches horizontally and vertically. (*Editor's Note: Thin rubber sheeting, impregnated canvas or oil cloth can be substituted for the paper if a more durable substance is desired.)*

This paper was drawn tight and taped down around the edges with drafting tape. A sheet of ¼-inch plexiglass was cut with an area extending about four inches beyond the edge of the paper. The air seal was created by a layer of cloth binding tape built up to the thickness of the screen wire and layer of paper. One layer of pressure-sensitive double-coated tape was stuck around the edge of the plexiglass so that it fit the outline of the tape on the photographic board.

How It Works

In using this frame we pull the top part of the plexiglass frame away from the camera board and drop the film down between the two. The pump is started and the original material is photographed through the sheet. In order to photograph through plexiglass a polarized light source and filter for the camera are both necessary.

The vacuum described above has been used in our office for two years with excellent results. The unique feature of the system is the extremely small volume of air needed to be moved in order to create a vacuum over about 20 square feet of surface. The air volume is about one cubic foot with our installation. This small air volume vacuum frame can be varied and each company should adapt its use to its special needs. □



VACUUM FRAME operates by pulling top part of plexiglass away from camera board, inserting film.

ANOTHER DIAMOND JUBILEE PRODUCT FROM HONEYWELL

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the most talked-about camera in years

HEILAND PENTAX H-2

No wonder photographers are talking about the Pentax! It's the lightest, trimmest camera in the entire single lens reflex field. And it's simplicity itself to operate, with no unnecessary, complicated gadgets—just precision controls that help you get the best pictures you've ever taken—

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- the single, non-rotating speed dial has speeds from 1 sec. to 1/500 sec., plus Time and Bulb.
- the razor-sharp, 6-element 55mm f/2.0 Auto-Takumar lens is the fastest available for the price.
- With this lens, the Heiland-Pentax H-2 is only $179.50.

There's a complete line of Pentax accessories and interchangeable lenses, too—from macro attachments for extreme close-up work to a 1000mm lens that will bring out the smallest features of subjects half a mile away.

See the Pentax demonstrated now at your photo dealer, or write for free folder, describing the Pentax and the complete line of eleven lenses, and accessories.

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Circle No. 546 on Post Card

TYPICAL SAMPLES of the varied work turned out by both offset and letterpress at Dairyland Press, Div., Doughboy Industries.

Printing is No Problem

Wisconsin manufacturer handles all types of jobs from simple price lists to four-color brochures easily in-plant.

Dairyland Press is both an offset and a letterpress graphic arts concern; both an out- and an in-plant operator; a producer of both low-grade wholesaler price lists and fine four-color process work. Yet one process camera serves practically all the negative production requirements of this subsidiary of Doughboy Industries, a Wisconsin manufacturer of toys, swimming pools, packaging machinery, wheat products and farm feeds.

Unique Applications

That camera is a Kenro "Vertical 18", and the inventiveness and initiative of Dairyland's operators and supervising personnel are apparent in the unique uses to which they have put it.

One particularly interesting application of the Kenro is found where a customer wants a 17″ x 22″ poster requiring large-size type not stocked by the company. Normally, these posters take a make-up man five hours to set. With the Kenro, however, the operator sets them to 8½ x 11″, in one hour. He then blows them up to 2x enlargement on the camera and has a plate, at required size, within one hour.

J. R. Kirley, general manager, remarks that every firm, no matter what size, has a storage problem for standing letterpress forms and Dairyland's is acute.

"Our use of the vertical camera," he said, "makes this storage problem immeasurably simpler. After press work is completed, a good repro quality proof is pulled and is either filed or put on the camera to produce an immediate negative, which is then filed. The proof can be shot, of course, at any time. This means that if the customer requires a re-run, it can be done offset with minimum delay and expense. In addition, this method releases expensive type metal for new uses."

Contact Screen Method

Initially, the Kodak Autoscreen Process was used by Dairyland for producing halftones, but the contact screen method is now used exclusively. The cameraman makes from 12 to 15 shots per hour. This does not include developing time, since the operator develops all negatives at once. If the operator has many changes in proportion between original copy and negative size, this production rate may be lessened, unless he doubles up his copy, as is often the case. □

ILFORD FP3 at work

Shots like this help explain why Ilford FP3 is the instinctive choice of so many industrial photographers whenever high film speed is not a must. They know FP3 will get everything there is to get, with the kind of contrast, definition and freedom from grain that adds salon quality to every print. And for enlargements, there is no finer film to be had. Try FP3 and *see the difference!*

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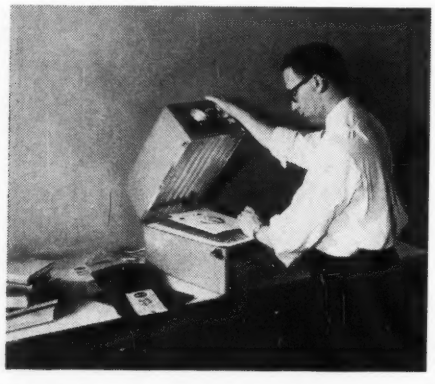
Circle No. 550 on Post Card

You can color your visuals inexpensively by using these simple diazo techniques.

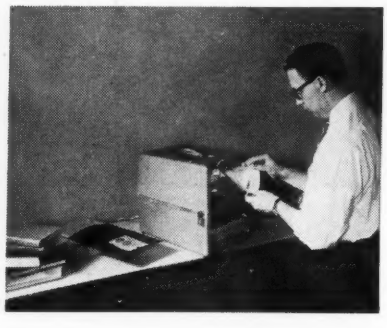
AUTHOR JAMES LEMAY creates a diazo master.

DIAZO MASTER is copied with a Projecto-Printer.

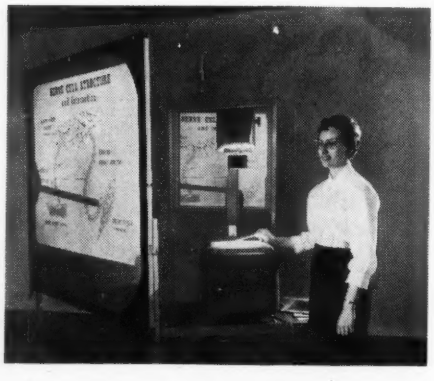


Add Another Dimension

FOIL is developed on a Projecto-Printer.



TRANSPARENCY is aimed at a mirror and reflected on the rear of the screen.



by JAMES LEMAY

Adding color to audio-visual communication is almost like adding another dimension to the visualization of ideas. However, in the past, the increased time and cost to produce color transparencies for projection has been a drawback to using such transparencies. Now, however, due to the diazo process, a combination printing and developing machine called the Projecto-Printer and a wide range of colored foils, rich, vibrant-looking color transparencies can be produced as quickly and easily as are whiteprint copies on office copying machines.

Creating a Master

A master is a hand-made original that is copied and printed as a transparency. An unlimited range of basic materials can be used in the preparation of diazo masters, since there is but one criterion that must be observed: a diazo master must be so constructed that when put in the printer, parts of it will block ultraviolet light and other parts will transmit the light. A photographic negative with its image of light and dark areas is an example to have in mind when creating masters.

Tracing paper is normally used as a master material; it will transmit light, and it is a simple matter to affix other materials which will block light — such as inks, tapes, pencil marks — to its surface. Don't worry about adding color to the masters. The color is added by Projecto-Foils in the printing. Trace an illustration from a textbook or create your own visualization. For optimum effectiveness, prepare color-separated masters to create transparencies of many colors and blends.

continued on page 48

TIME-O-LITE BREAKS THE CUSTOM PRICE BARRIER!

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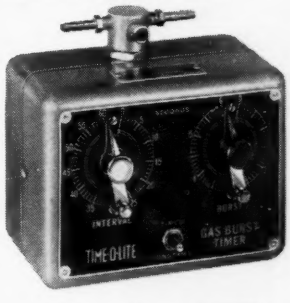

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DIAZO TRANSPARENCIES

continued from page 46

Copying the Master

Open the Projecto-Printer top. Place an inter-leaf sheet on the cushion. Select a colored Projecto-Foil and place it sensitized side up on top of the inter-leaf paper. Put the master to be copied face down on top of the foil. Close and latch the top. To expose, set the timer for the required exposure time (from one to three minutes) and depress the pointer. The lamps will light, exposing the Projecto-Foil to ultraviolet light, and will turn off automatically at the end of the exposure time.

Developing the Foil

Remove the exposed foil from the exposure section, roll it with the sensitized side inward and insert it into the developer tube. The developer is an ammonia tablet, which is simply loaded into the developer chute on top of the printer. Push the white developer starting button. The developer tube light and circulation system provide warmth and air flow which assures fast, even development. Development time is approximately 1½ to three minutes. The transparency is now ready to be put in a simple paper mount and projected by an overhead projector. □

James LeMay is in the Audio-Visual Department of the Ozalid Division of the General Aniline & Film Corp.

Furniture Designer Turns Photographer

Designer Lawrence Peabody of Boston, Mass., returned home recently from the Chicago furniture markets with a voluminous photo record of current design trends. Peabody shot the show for his files with a Minox B subminiature and credits this application of photography with helping him keep ahead of his competition. His motto, as would be expected, is "one good picture is worth ten thousand words."

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Microfilm Housed In Plush Cavern

When microfilm is used as an anti-disaster medium, the actual microfilming procedure is only Part I of the story. Part II involves the storage of the valuable film.

A variety of systems and sites have been devised to protect microfilm from damage or destruction. One of these modern-day arrangements uses man's oldest refuge from danger, the cave.

Fifty-odd miles from Pittsburgh, in a worked-out Allegheny Mountains mine 220 feet below the surface of the earth, is a records retention center operated by the National Storage Company. It rents space to some of the nation's largest corporations, including the Westinghouse Electric Corporation and Aetna-Standard Company.

While National Storage will itself maintain a customer's records, it will also make available entire chambers to individual firms which desire areas of their own. These may be staffed by the firm's own personnel if extreme security precautions are involved, although all of National Storage's own employees must pass a rigid security check and are thoroughly trained in records management.

Transported by Truck

Records are brought to the vaults by trucks, which enter the area through a reinforced concrete portal 110 feet below the ground level. Fifty feet inside the portal stands a three-ton steel gate, which is continually manned by armed guards.

Within the vaults, the archival materials are stored under climatic conditions prescribed by the National Bureau of Standards for permanent preservation of both microfilm and paper records. Temperature is maintained at a level of 70 degrees, and the humidity is kept at 57 per cent.

Temperature changes slowly in underground areas. It took about three months to heat the area in which Westinghouse stores its records, and it would probably take another three months for it to cool down if the heat was turned off right now. Nevertheless, a diesel power plant is ready to take over immediately the job of providing both heat and light should public power fail.

Clients wishing to obtain prints from microfilm stored in the vaults can take advantage of Recordak equipment installed there. It will turn out more than 1,000 linear feet of prints an hour.

Finally, the underground fortress is prepared to help companies face the job of resurrecting their business from microfilm after the most extreme of disasters — nuclear war. Complete operational headquarters — including living accommodations for key personnel — can be provided for the days immediately after an attack.

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REPUBLIC

continued from page 34

which we operate at 10 feet per minute."

Changing over to Retrievable Miniaturization was not a difficult procedure, but did present some problems. Republic's existing drawings had not been drafted for half-size reproduction. It was felt that the results would be satisfactory but not optimum. Therefore, it was decided to launch the program for the bulk of drawing releases and screen everything for legibility. In conjunction with this program, required changes in the drafting procedures were initiated to assure that subsequent releases would meet the reduction requirements.

Other advantages of Republic's reduction technique include reduction of filing space requirements, cutting the shipping weight of prints sent to vendors and easing of the sheer physical burden of handling all the material that passes through its reproduction department. □

WASH AWAY

continued from page 30

perimenting with wash methods, using the Herculene-Duraler team. We decided to give it a try.

Basic Testing in Drafting Room

Various types of drawings were made and then printed. The resulting copies were first-rate.

We then dirtied the originals until they were barely legible and completely unprintable. A quick washing with mild soap and water removed all the dirt but left the drawings intact. Prints made from drawings after several washings were as clear as the prints we received from the fresh drawings.

To determine how much abuse the "engineered" surface could

continued on page 67

REPRODUCTION TRENDS

In fifteen minutes, the small stack of copies above was made from a weak original drawing. In exactly the same time, two POST *Intermediate copies of the drawing were made and, in turn, produced the large stack of better-grade copies.*

Get better prints, faster production, using POST Intermediates

Direct-positive ammonia prints are a well-accepted technique in copying engineering drawings. Less commonly known is the time-saving technique of making a reproducible intermediate better than the original by the same process—using highly sensitive, Control-Coated POST Intermediate Prints on vellum, cloth or film.

POST Intermediates provide not only a translucent duplicate master for direct pencil or ink alteration, but a copy which often can actually reproduce stronger, denser image lines than the original.

Making a subsequent intermediate copy from the first POST intermediate, and another from the second one, gives maximum image density for rapid diazo printing, yet without objectionable build-up of background tones. This applies whether ten copies or one hundred are made, whether all at once or over a period of time, whether from one POST Intermediate or several. And, for really fast print production, one operator can feed up to four intermediates in rapid sequence.

Such products as POST Vapo-Vel, Filmtex, Tuf-Tex and Vapo Cloth can often help your company solve the problem of salvaging old originals—can give a very stable, accurate, long-lived "original" for fast, multiple print-back—at a cost only slightly higher than regular diazo prints.

For a complete kit of POST Intermediate materials and application information, ask your POST dealer or write Frederick Post Company, 3662 North Avondale Avenue, Chicago 18, Illinois.

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Big new plus in these 3 films is Kodak's Estar Base which gives much longer life and greater dimensional stability to reproductions of drawings, maps, documents.

These new Estar Base films are highly translucent for fast "print back". . . have an excellent matte surface on both sides for easier drafting . . . won't turn yellow or become brittle . . . and are resistant to moisture. Available in popular cut-sheet sizes and in rolls up to 52 inches wide.

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2. Kodagraph Contact Film, ESTAR BASE
Bound to be a darkroom favorite in making same-size reproductions of old or weak line drawings and other documents from film or low-cost paper negatives. Exposures are made with standard contact printers. Processing done with either paper or litho developers. Exceptionally wide latitude of this film all but ends make-overs.

3. Kodagraph Projection Film, ESTAR BASE
Changing scale is easy with this high-contrast, quick-processing film. It gives you sharp, clean results when enlarging microfilm negatives, or reducing large drawings, blueprints, maps. Can be handled with "1A" safelight, and exposed in enlargers, projection printers, process cameras.

Really something every engineer, draftsman, and blueprinter should get full details on now. Call your local Kodagraph dealer for free literature, or write to Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N.Y.

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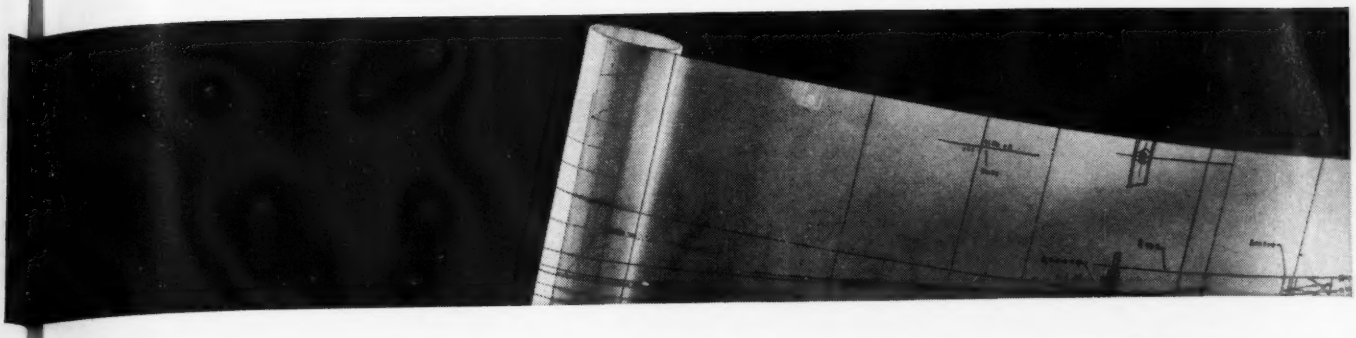

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Circle No. 571 on Post Card

continued from page 16

ard 16mm sound speed of 36 feet/ min. and can thus handle the leading end of the film while the remainder is being processed. To achieve correct orientation of the head and the tail of the film, for immediate processing, it is rewound on receipt from the camera crew and before being fed on to the machine.

At the demonstration of the unit at Newmarket, England, in July, the projector used was a Debrie fitted with a tungsten lamp. The low contrast result given by the bleached film with this illuminant is unimportant here since the projector is fitted with a mirror which deflects the image into a small Pye Industrial television camera. The low contrast image provides a clear television picture on the monitor screen in the processing trailer and on the remote monitor set which can be installed in any convenient location for the judges. If it is decided that having viewed the film through the television link, further examination is needed, then the spooled film is brought to the judges and projected on the Simplex-Ampro direct.

This projector, in addition to having the modified lighting system, also incorporates a remote control unit operated from a handset. A multicore cable from the projector connects the handset, which is fitted with three switches giving on-off, fast-slow, forward-reverse. The fast switch setting gives 24 frames/sec. and, in addition, the standard still picture device which is fitted to this projector permits detailed examination of a single frame if needed.

The reverse setting is offered since it has been found that reverse running is often a satisfactory way of establishing precisely what happened in a disputed incident.

From these details it will be seen that this new camera patrol

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HIGH SPEED CONGRESS

catch it before it's gone

by **MORTON SULTANOFF**

Interest in photographic instrumentation and high-speed photography has literally skyrocketed in the last decade. This interest is reflected directly by the diversity of topics to be discussed, the number of nations represented, and the number of people scheduled to attend the Fifth International Congress on High-Speed Photography sponsored by the Society of Motion Picture and Television Engineers in Washington, D.C., October 16-22.

Delegates from 16 nations will attend the Congress, which has been officially supported by the U.S. Government; thirteen nations are represented on the papers program. Participation is planned by the SMPTE, Society of Photographic Instrumentation Engineers and the Instrument Society of America.

The technical program, arranged by topics, covers such fields as light sources, short exposure single-shot shutters, multi-exposure cameras, intensification techniques, new equipment and materials, and control systems. Applications in areas from biology to ballistics, aerodynamics to machine analysis, X rays to data reduction, and microscopy to space technology will be handled in the six days of technical presentation. The following papers, representing only a fraction of the program, are cited to indicate the scope of the Congress' coverage.

Dr. Ing. H. Schardin, chief of the NATO Lab, St. Louis, France, a 40-year veteran in high-speed research, will discuss "The Use of Multiple-Spark Cameras for Experiments on Subjects Which Require Long Time." Dr. J. S. Courtney-Pratt, Bell Labs, whose name is a high-speed byword, will elaborate on "Some Unconventional Methods of High-Speed Photography," including two new techniques, sectioned-lens photography and high-speed x-ray recording.

Two full sessions will be devoted to light sources and their applications. In this field, Prof. Harold E. Edgerton, father of the strobe light, will discuss "Holdover in Xenon Flash."

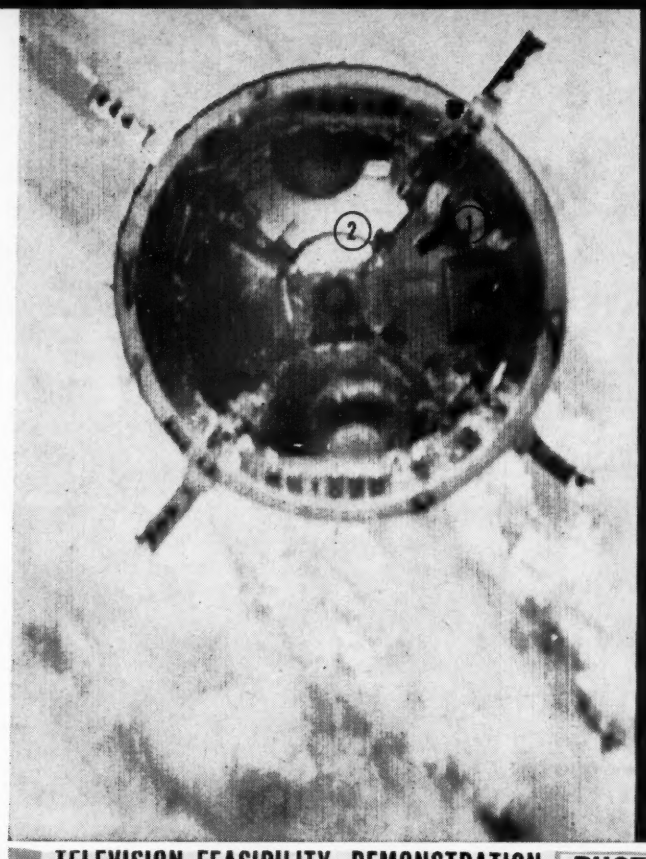
An unusual optical invention for image intensification by use of a special optical "sandwich" will be presented with typical results.

Topping the formal presentations will be an unprecedented exhibit of high-speed cameras, optical instruments, photographic components and data reduction equipment and materials from domestic and foreign manufacturers. There will also be displays of work by government agencies and public institutions.

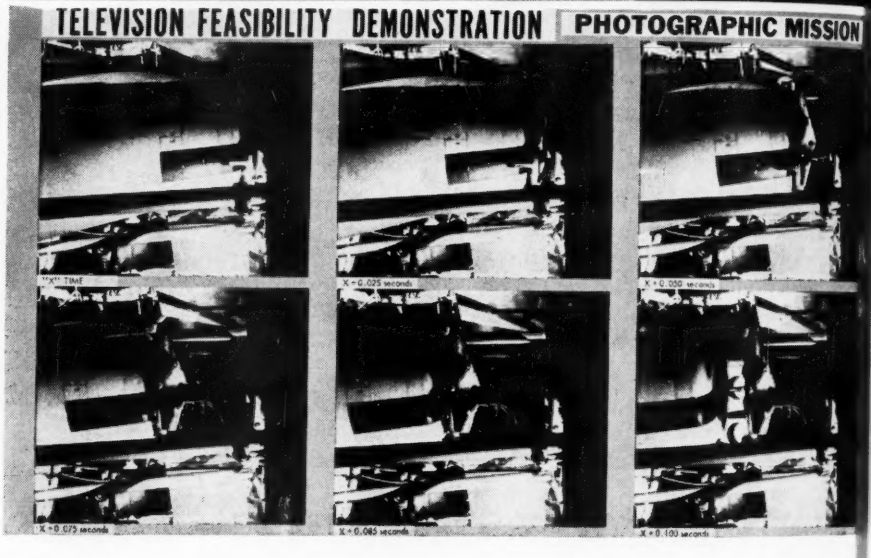
All in all, the Fifth International Congress promises to cover the entire spectrum of high-speed activities and should be a must for everyone working in the field. Complete information, including an outline of all technical sessions, papers and all other activities, as well as pre-registration forms can be obtained from the SMPTE, 55 West 42nd Street, New York 36, N.Y. □

About the Author

Mort Sultanoff, associate chairman for technical sessions at the Fifth High-Speed Congress and an IP high-speed advisor, has participated in every such Congress. Currently, he supervises photo-instrumentation in the U.S. Army's Terminal Ballistics Lab, Aberdeen Proving Gd.



AT THE TOP RIGHT is a television picture showing the missile warhead speeding to its target below. It shows the camera pod (1) with its cameras photographing the capsule and the flash lamps (2). BELOW are movie frame blowups from the Milliken DBM-3 within the camera pod.



Army operation proves feasibility of using a flying TV camera as a reconnaissance device.

by B. M. MOLLBERG
Chief, Photographic Department
Chrysler Missile Division

OPERATION

FLYING TV S

"The Army wants to put three movie cameras in a Redstone missile. How would you like to work on the project?" With these words, Chrysler Missile Division's photographic Department became involved in "Operation Flying TV Station."

The project was to be a demonstration of the feasibility of using a flying TV camera as a reconnaissance device. It called for modifying four Redstone missiles and installing TV capsules. The first capsule would contain various test instruments but not a television camera; the other three were to be outfitted with live TV cameras.

Our job was to develop a system of three missile-borne motion picture cameras that would be capable of photographing both the separation of the missile warhead from the rocket booster and the subsequent ejection of the TV capsule from the warhead. In the system adopted, one camera was to be mounted on the Redstone thrust unit and two cameras were to be placed within the warhead of the missile. The thrust unit camera would go off immediately at separation and photograph the warhead as it pulled away. One warhead camera would photograph the TV capsule ejection mechanism in case of a malfunction, and the second would track the capsule as it went into space to record any roll, pitch or yaw experienced by the capsule.

Recovery a Problem

We faced a serious problem in the recovery of the cameras. Past experience showed that the thrust unit usually exploded at entry, though destruction was not complete. The warhead, on the other hand, comes in like a bullet at a speed of over mach two. Pieces recovered from it can be identified only by serial or part numbers when these happen to be on the pieces found. Therefore, it was decided that the thrust unit camera should be mounted in an armored box and allowed to ride to impact with the thrust unit. The two warhead cameras, however, had to be mounted in a recoverable camera pod to be ejected from the warhead after the cameras had expended their film. This was handled via a parachute recovery package worked up for the Army by Cook Research Labs.

How much weight the package could hold was known and this played a part in selecting a camera. Also important was

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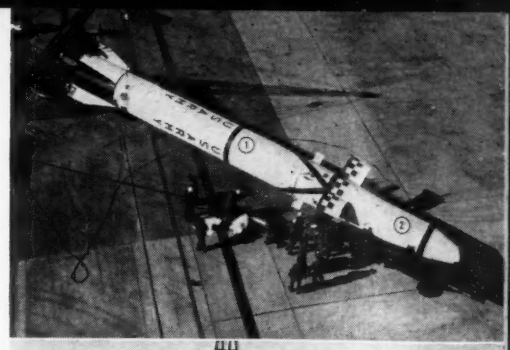
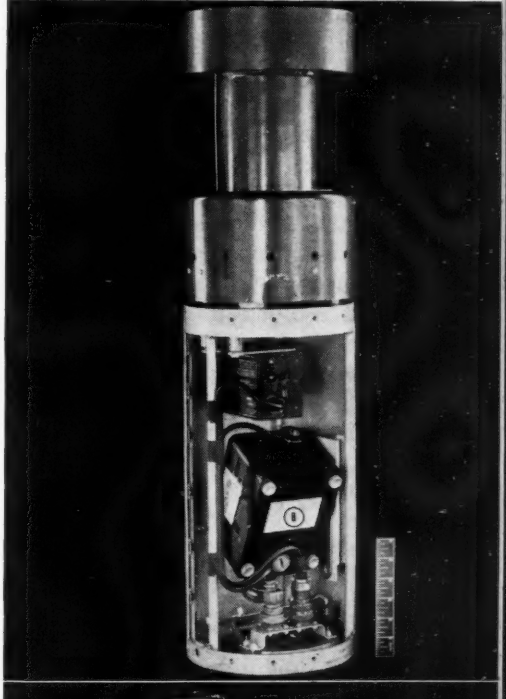
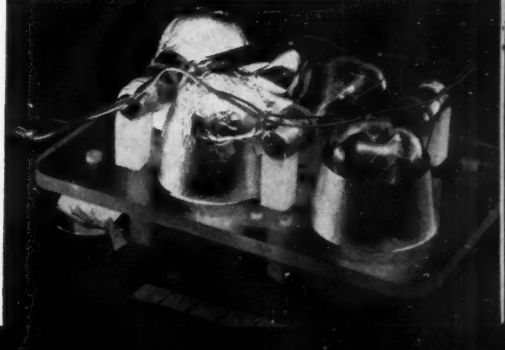




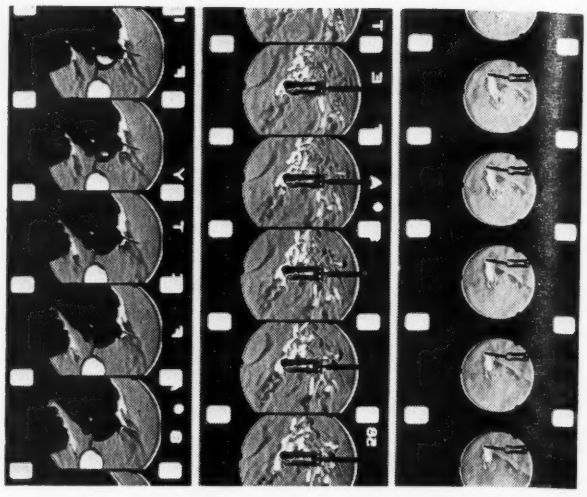


TOP TO BOTTOM: Missile on launch pad: (1) thrust unit with thrust cameras; (2) warhead with TV capsule and camera pod; (3) armored camera container in thrust unit; (4) armored container; (5) battery box; (6) initiating switch; (7) TKB-3A camera and (8) DBM-3 camera in pod; four Sylvania FF-33 flood lamps in flash assembly position.

STATION

High-Speed

What equipment, materials and know-how do you need to make pictures like these?



by K. H. LOHSE

Simply stated, high-speed cinematography is dedicated to one purpose: *the recording of fast occurring events which cannot be studied in detail with conventional photographic methods.*

High-speed cinematography techniques produce true motion pictures in ultra-slow motion. The films can be played back in regular or special motion picture projectors, enabling the viewer to see the event as it happened but much slower. This technique has received the appropriate name *magnification of time.*

Unlike normal-speed motion picture cameras, where the film advance is stopped for each exposure, in high-speed motion picture cameras the film runs continuously at a high rate of speed. The image follows the film by means of an optical compensator. This can be a rotating prism located between lens and film. Other optical compensators are rotating mirrors and multiple lens disks.

Auxiliary High-Speed Equipment

Power and Camera Controls. Depending on the design of the camera, high-speed equipment ranges in weight from a few pounds for airborne use to several tons for some permanent installations. In between we find the range of so-called portable high-speed equipment. Control units are either built into the camera or come in separate units. Their basic purpose is to start and stop the camera automatically by means of accurate timing devices and to control the light sources and the events. It is obvious that a camera running at high speed for a short duration, and a rapidly occurring event cannot be synchronized without the aid of special equipment.

Timing Equipment. In order to analyze the time-motion relationship of an event, we need an accurate record of time on the film. Most high-speed cameras are equipped with argon glow lamps which respond to the cycle rate of alternating current.

Special pulse generators are used to supply the timing lamps with current of a pre-selected cycle rate. One can thus produce on the edge of the film 100 or 1000 timing "pips" per second. By measuring the distance between timing pips and the relative motion of the image of the event, one can better analyze high-speed motion pictures.

High-Speed Motion Analyzers. These are precision instruments which enable the time-motion measurements to be performed. Some analyzers are equipped with data-recording apparatus which produces material that can be fed directly into computers.

Other Equipment. In order to measure the various factors affecting the exposure of the high-speed pictures the following are required: timers, voltmeters, ammeters, transformers, rectifiers, light meters and color temperature meters.

Light Sources, Films and Filters

Light Sources. The extremely short exposure times encountered in high-speed photography require tremendous amounts of light.

Normal daylight is generally not considered a good light source for high-speed photography. However, the development of faster film emulsions and faster lenses has made even this type of high-speed photography possible.

Tungsten light sources are easier to control than daylight. Many types of light bulbs and lamps have been developed, especially for high-speed photography. Since it is good practice in high-speed photography to record on film only one essential part of an event at one time, the

Karl-Heinz Lohse is head of the Photographic Science Laboratory, Aeronutronic Division of Ford Motor Company, Newport Beach, California.

field sizes in high-speed photography with incandescent light are relatively small. It is, therefore, feasible to concentrate a tremendous amount of light on a small area, thus yielding excellent exposures. Water cells frequently must be used to prevent the heat from the lamps from reaching the object to be photographed.

Specially designed lamps are equipped to take a series of focal plane type flashbulbs, which are generally fired in sequence when the camera has reached top speed. The light output peaks of the bulbs overlap, giving up to one second of a continuous flash with sufficient light to expose, e.g. 50 feet of color film at a rate up to 3000 frames per second. Cameras operating on a cycle of 1/100-second or less may require only the firing of single ordinary flash bulbs as a light source.

Repetitive electronic flash sources can be synchronized with cameras running at 10,000 frames per second. They represent efficient light sources and yield sharp pictures since the effective exposure time of the camera is shortened.

Some special illuminators use either high power gas discharge tubes or open sparks, the latter being used especially for high-speed shadowgraphs, schlieren and ballistic applications.

Explosion proof lamps, which can be used in coal mines and other hazardous surroundings, have recently been developed.

Many objects or events photographed are self-luminous and have high enough light outputs so that no other light sources are required. Some such objects are atom and hydrogen bombs, rockets, jets, explosions, fires, flames and liquid metals. In cases where the surroundings of a self-luminous object have to be recorded, additional artificial lighting is indicated.

Films. Most photographic sensitive materials used in high-speed photography have standard emulsions. The faster types are more

continued on page 74

a reel triumph

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Exclusive TENZAR backing on new "SCOTCH" BRAND Magnetic Tape

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Related Reading

35mm Photography

Ziff-Davis Publishing Company, New York, $1.00.

The 1960 issue of this annual summarizes technical trends, presents a run-down on available products and offers a manual of practices. Highlights include Cora Wright's comprehensive "Lexicon of Lenses" and Dave Eisendrath's article on today's need for more sensitive exposure meters.

Photogrammetry and Photo-Interpretation

Stephen H. Spurr, Ronald Press Co., N. Y., N. Y., 467 pp., $12.

All the information necessary for making topographic measurements from aerial photographs is included in this thoroughgoing textbook. Although the volume is intended for foresters, geologists, soil scientists and engineers, it will prove useful to anyone who works with aerial photos as a professional tool.

Control Techniques in Film Processing

Society of Motion Picture and Television Engineers, New York, N.Y. 180 pages, $5.00

A group of top technical men — many of whom are from motion picture labs — have all contributed to this report, which outlines quality checks for processing movie film. The book is not intended as a textbook of detailed instructions, but more as a foundation for the understanding of proper process control techniques.

Chapters deal with instruments for photographic control, control strips, sensitometric control and the chemistry of film processing. Ample illustrations and graphs contribute to making the book a solid reference text which belongs on the book shelf of the in-plant motion picture processing unit. The principles and procedures should be applicable to both the small and large laboratory, according to the foreward.

How to Use Your Camera Afloat

H. S. Newcombe, Focal Press, Ltd., Great Britain, 160 pages, $5.95.

TAKE FADES...LAPS...

Ultra-fast F/2 ZOOM LENS

New Pan Cinor 85 zooms from 17mm through 85mm, with reflex through-the-lens focusing and viewing as well as split-image range finder. *This lens takes unusually sharp detail and color rendition.* Has C-mount for 16mm cameras. $420.00.

All prices include Federal Excise Tax where applicable.

A raft of specialized books are available which explain how to photograph cats, children, bugs, grandmothers, leaves, etc. Now a book on nautical photography by H. S. Newcombe joins the ranks. The author has sailed a variety of craft between two and 15 tons and is a member of Britain's Royal Ocean Racing Club. However, his main interest is in sailing photography, with its unhurried opportunities for using a camera.

The book discusses the type of camera to use, how to handle it, film speeds and, lastly, how to take pictures from ocean liners. Practical admonitions are sprinkled through the book. For instance, there's one on not leaving a meter near the steering compass since the meter contains a magnet which might affect the compass's accuracy. If you're an old salt who finds pleasure in shooting boats this is the book to tell you how to do it.

Pocket Photo Data Book (2nd Edition)

Morgan & Morgan, Inc., New York, 154 pp., $2.25.

Owners of the first edition of the Pocket Photo Data Book can now update this handy loose-leaf directory by sending for these new pages, which represent a substantial revision. Included are the new ASA exposure indexes for all types of films, ASA additive film speed for newer cameras with EVS settings, plus color data for the latest American and foreign films.

In addition to tables and charts, there is instructional material on the nature of different kinds of film, an explanation of how to use gray cards, indoor and outdoor lighting, etc.

There is a supply of model release forms, and photographers should find the time-gamma-temperature development charts for negative control very helpful.

Directory of Professional Photography

Professional Photographers of America, Milwaukee, Wisc., 144 pp., $5 (free to those buying photos).

This volume has been issued to provide libraries, purchasing agents and other users of photos with a guide to U.S. and Canadian photographers. The directory contains a cross-indexed listing of more than 6,500 PP of A member studios and photographers categorized by state, city and classification.

Twenty-five specialized fields ranging from aerial mapping through industrial illustration, legal photography and theatrical photography are listed in the Commercial Qualification section. About 300 photo specialists and studios are included in this chapter.

This volume should be of help to both buyers and sellers.

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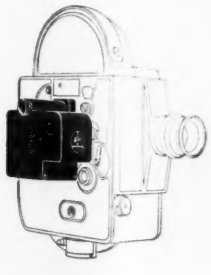
New variable shutter on Bolex 16mm Reflex puts fades at your fingertips. Hand backwinding for dissolves. Parallax-free through-the-lens viewing and focusing while shooting. Footage and frame counters . . . speeds 12 to 64 fps . . . settings for time exposure, single frame and continuous run . . . many other extras. (*Automatic* REXOFADER *shown on camera is a new push-button control that times fades,* optional at only $37.50.) With Lytar 25mm f/1.8 lens, the Bolex H-16 REX is only $400. (Lenses shown optional at extra cost.) Write Department BIP-10 for literature and name of nearest dealer.



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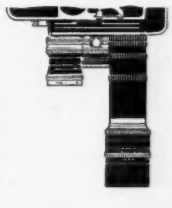

Bolex 16mm Extension Tubes
Perfect for macro-cinematography! Allows ultra-sharp close-ups of extremely small objects. An easy, inexpensive way to new professional effects with your camera. Set of four tubes, $15.00.

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Sipley on Patents

DR. LOUIS W. SIPLEY
Director, American Museum of Photography

Just prior to going to press for this issue, an interesting letter arrived from H. W. Sachs, Engineering-Photo Records Department, Remington Rand, regarding our mention of *U.S. Patent 2,908,572* (February 1960, p. 66). This patent, issued to Andre Schoen after his death, was assigned by his executrix, Alice L. Schoen, to General Aniline & Film. Mr. Sachs advises us that Schoen was "the original inventor of the vesicular diazo process involving nitrogen bubble formation and development of density by scattering rather than opacity." According to our correspondent, foreign patents were issued on applications of the Schoen invention during the period it was being held up in the U.S. Patent Office. (Application for U.S. Patent was filed December 28th, 1955.) The main point of Mr. Sachs' letter, however, was regarding our use of the phrase "General Aniline & Film *has acquired* . . ." His opinion is "this patent has not been acquired but is *owned* by ———." We appreciate the information on Schoen and regret that our wording may have been misunderstood. However, we would point out that we used the verb "acquire" instead of *receive* (an acceptable synonym, according to *Roget*) just as we frequently use the verb *obtain* when mentioning a company or corporation which is the assignee given by the U.S. Patent Office at the time a patent is issued. As used in this column *ownership* of a patent is indicated following such words as *obtain, receive, acquire* or *been assigned*. This detailed explanation is made in case our exact meaning has been unclear to any of our other readers.

An Animation Apparatus

The in-plant cinematographer who is faced occasionally with the task of turning out special films for the sales and advertising departments will find an interesting device in *U.S. Patent 2,937,564*. This was issued to Charles W. Halford, Jr., of Salt Lake City and covers an apparatus for producing animation and display effects to be recorded on motion picture film, whether for theatre, television or sales display purposes. The apparatus is designed to produce a wide variety of animated or moving pattern effects on a translucent screen, such images to be recorded by a motion picture camera in front of the screen. The design includes an illuminating source for the screen, a variety

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NEW PRODUCTS

continued from page 10

Improved Reflex 105

The well-known 35mm *Alpa* single-lens reflex has been recently updated with the addition of the Model 6c. The new reflex now features full 90° viewing and an ultra-fine groundglass with a 1:1 image. In place of the direct view eyelevel finder present on other models, the 6c now sports a built-in Metraphot exposure meter. Other features of the latest Alpa include a front-mounted rapid wind lever, release button for automatic-exposure counter return, a unique pull-out high speed rewind crank and complete synchronization with PC outlets. A complete set of 10 lenses with automatic diaphragms is also available. The Alpa 6c is normally available with either a *f*/1.8 50mm Macro-Switar or regular Switar. Price: with Macro-Switar, $459.00; with regular Switar, $399.00.

Presensitized Offset Plate 107

High volume users of offset plates for systems applications will be interested in the new presensitized plastic-fibre plate introduced by the *Polychrome Corp.* Called Rapidkote, the plate may be exposed for halftones in 20 seconds and up to 60 seconds for line copy. After exposure, a visible image eliminates confusion in proper mounting. Because of its plastic-fibre base, the plate is said to provide accurate registration and to completely resist curls.

Photocopy Paper 109

A projection speed photocopy paper designed to reproduce fine screened negatives with dot deterioration has been introduced by *Peerless Photo Products, Inc.* The paper, called Tru-Dot, is said to have unusually high image resolution and permits paste-ups to replace the usual stripping-in operation. This is accomplished by first shooting a fine screened negative, which is then sandwiched with Tru-Dot in a vacuum frame and exposed for six seconds. After being processed in a litho or fine-line developer, the print may be pasted up on the mechanical as needed. The entire mechanical with half tones in place is then shot in a process camera to produce a single negative. The paper is available in single weight glossy baryta coated stock.

Tripod Head 106

Complete control for smoother panning in both horizontal and vertical positions is claimed for the Senior D head manufactured by *Miller Professional Equipment*. The Miller head

operates on a semi-hydraulic principle, utilizing two factory-sealed units filled with a medium grade fluid. All

continued on page 85

of such units being provided, and a rack assembly for supporting one or more transparent sheets or negatives between the light source and the screen. The moving pattern effect is obtained by movement of one or more lamps in the illuminating unit or by relative motion between the light source and one or more transparent carriers for the pictures.

Reproduction of Engineering Data

This invention has to do with reproducing engineering data and relates to the accurate and identical reproduction of loft layouts, and particularly to reproduced layouts to be used for drafting work. The patent covering this invention, *U.S. 2,940,850,* has been issued to Cecil G. Shuert of Grosse Pointe, Mich. This invention makes use of a negative formed of glass with transparent lines and an opaque coating between the lines. The glass is coated on one surface with a thin emulsion of the ammonium dichromate type which is temporarily photosensitive. This surface is placed in face contact with the loft drawing to be reproduced, to produce a negative with clear, sharp, transparent lines. This negative is then printed on metal which has first been coated with a slightly porous white paint and then sprayed with a combination dye and sensitizer mixture which is rather thin. A bichromate-type sensitizer and a casein vehicle dye are preferred by the inventor. Following exposure, development is with water to remove unexposed sensitizer. The resultant line, which remains colored according to the dye used, is flush with the paint surface, since the dye and sensitizer have penetrated into the pores of the paint. The surface of the panel is then cleaned with an oxalic acid solution and rinsed with water, leaving the design in a tough durable form, which will not smear or abrade. The inventor claims this process can produce a 5′ x 14′ print in 30 minutes as compared with two hours required by some older processes. □

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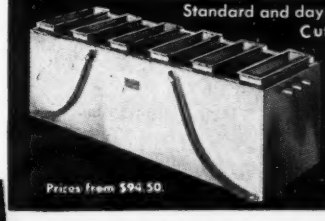
DELUXE TYPE "C" PROCESSOR

Most functional, versatile and economical system for prints 16″ x 20″ and smaller. Uses only 3½ gallons of solution per tank. All chemical tanks centered around quick dump tank. Has a wash tank and a water jacket regulator. Extra large sump tank. Processes six 16″ x 20″, 14″ x 17″, 11″ x 14″, or 24 8″ x 10″ prints per load. Width 35½″; length, 61″; height, 33″. Complete ready to install. Price includes timer, Saran basket, regulators, spray attachment and gas pressure gauges.

Model 1620-14CP — $2,590

COLOR PROCESSING TANK SETUP

Safe, efficient temperature control. Type 316 S.S. Double lockseams. Extra long jackets for thorough rinsing. Baffle prevents bleach backwash. Self drain hose. Standard and daylight tanks. Cut film sizes from 4 x 5 to 8 x 10



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Sinks have full ½″ radius on corners and all inside contours. One-piece heli-arc welded 316 SS construction. Easy to clean and maintain. Stands are heavy steel with chemical and condensation resistant finish. Large, sturdy shelf, four leveling bolts. Order with or without splash guard. All sizes, 18″ x 36″ x 6″ to 47″ x 120″ x 10″.

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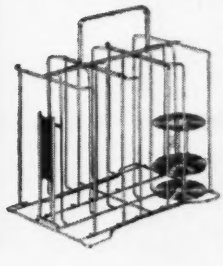
REEL RACK



For 35 mm, 120 and 620 Nikor reels. No reel center posts allows light to pass through reels to film for reversal. Fits any 3½ gal. tank. Type 316 S.S. All parts are welded. A rugged unit. Capacity: thirty 35 mm or eighteen 120-620 reels, or any combination without costly adapter. Has control strip film holder. $23.50

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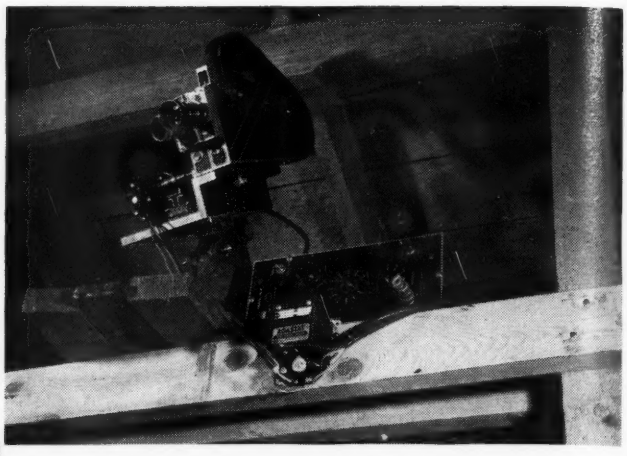
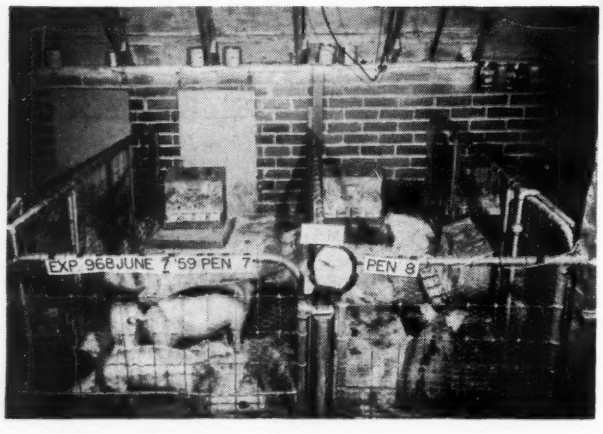
CAMERA SETUP used for putting pigs on film.



TIME-LAPSE films show if piglets turn their snouts up at some feed.



Pig Picturing at Iowa State

Cinematographers record life and times of baby porkers.

In what is recognized as probably the first attempt to study the eating, drinking, sleeping and playing habits of the baby pig, scientists at Iowa State University's Swine Nutrition Division are using time lapse cinematography to help solve one of the most common and critical problems in pig production—getting the baby porkers to eat more early in life. Louis A. Facto, Iowa State Experiment Station photographer, is handling a project which records how baby pigs react to various flavors and odors of pre-start foods.

Piglets Have Sweet Tooth

Swine nutrition experts have long known that little porkers have a sweet tooth and that baby pigs prefer the sweet flavor of sow's milk above any other food. However the full value of this quirk of young pigs was never fully realized until the project.

By analyzing the chemical content of sow's milk, the many delicate flavors and odors in the milk were found. Then came the job of discovering which flavor and odor components were needed to produce artificial feeds so like sow's milk that the pigs would gobble it up.

Photographer Facto set up a 16mm movie camera, controlled by a time clock, to shoot single frames every 12 seconds. The purpose was to ascertain any peculiarities or uniformities regarding individual differences of group dynamics which would indicate preference for certain kinds of feed. The subjects were photographed as they were fed different flavor combinations.

As a result of the observations, many baby pig feeds now contain flavor additives. Although new to the market, these have proven successful.

In addition to helping commercial feed suppliers, time lapse pig cinematography is helping farmers because, traditionally, the first few weeks in a pig's life are its most critical. Strange as it sounds, getting a pig to eat—when its mother's milk is not readily available—can be quite a problem. The development of porker taste-tempting foods provides an easy and economical way of supplying the piglets with health-protecting feed additives.

And Ham Steak, Too!

But the greatest benefit is expected to acrue to the man-in-the-street. By recording exactly how the baby pig takes to substitutes for his mother's milk, it is anticipated that the pigs will make hogs out of themselves gobbling the feed up and thus grow up to make better porkchops.

As photographer Facto puts it, "We have only scratched the surface with this technique." □

continued from page 54

system is similar in many ways to those used in the United States, particularly in respect of the camera equipment used. But the processing, based on the unusual develop-bleach routine is decidedly different from anything in common use hitherto. The white positive image that this system produces is then turned to good account in providing a satisfactory low contrast image for the television remote monitor pickup. When projected, subsequently, for direct viewing, the highly specular lighting provided by the mercury vapor lamp does full justice to the high resolving power of the Ilford film.

When the British Jockey Club decided to introduce this type of camera patrol in 1957, it is reported that the methods then in use in other countries were studied but none provided the fast mobile set-up which was required. After spending some $56,000 on developing the system, it is now claimed to be technically in advance of anything elsewhere, saving race courses executives undue, heavy capital expenditure and providing both them and the public with a much needed service. □

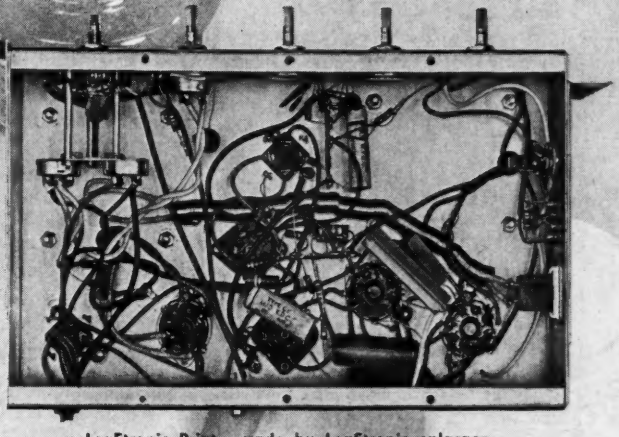
Air Force Orders Research Into Dry Film Processing

Technical Operations, Inc., is evaluating a new photographic process for the U.S. Air Force's Air Research and Development Command which would provide instant pictures with no liquid processing.

The technique — known as photopolymerization — works this way: The film on which the photo is taken is, itself, the finished picture. In this process organic carbon-chain molecules are made to link up into long chains by the energy of light. Where light strikes the film the larger molecules are created. This forms the picture. The large molecules — polymers — are 10,000 times bigger than the smaller ones.

cut your artwork costs over 30% with LogEtronic® prints

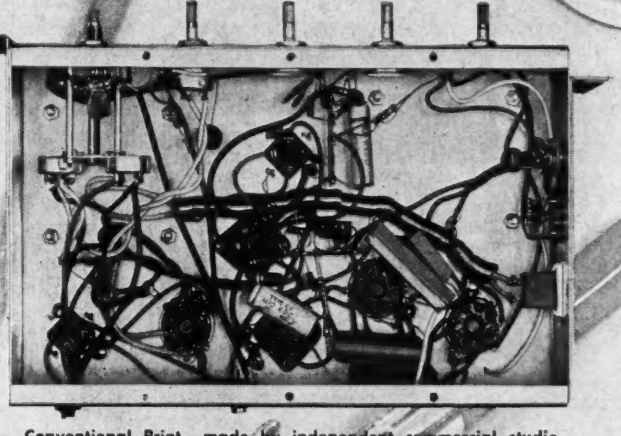
How much would you have spent to retouch these prints for good halftone reproduction?



LogEtronic Print—made by LogEtronic enlarger

For minimum retouching by a commercial art studio, we spent $20 on the LogEtronic print and $30 on the conventional print.

Judge for yourself. In the LogEtronic print, you see greater detail in the shadows, midtones and highlights —exactly the kind of detail you need for good reproduction, detail produced automatically by LogEtronics precision electronic control of the light alone. Not even $10 extra retouching on the conventional print brings out the same detail!



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How about you? How many extra dollars are you spending to retouch conventional prints? If you make 1000 prints a year for reproduction, you can save $10,000 in artwork costs—over 30% —with LogEtronic equipment. Can you afford to lose $10,000?

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High-Flying Photographers

Ever wondered what it takes to wear the wings of a USAF scientific photographer? This article tells you.

by LT. COL E. R. STRANDBERG

Photography is important to the U. S. Air Force — and so are the men who take the photographs. Since Air Force cameramen must carry out a variety of assignments, only the most experienced are given this position.

For a typical example of a diversified photo set-up within the Air Force, let's take a look at the photography branch of the Air Force Flight Test Center at Edwards Base in California. Our department performs all still and motion picture photography required to support center activities and projects that are assigned to the center by the Army, Navy or civilian contractors. Research and development photos, instrumentation, photogrammetry, time and motion studies, and missile and flight testing, all are handled by our men.

When entering the department, men are classified as motion picture, still or aerial photographers. The aerial men are the most skilled of the three groups — they must be capable of shooting still and motion pictures and have taken aerial shots from jets. Cinematographers must have experience using standard motion picture cameras such as the Mitchell and Bell & Howell 16mm models. Ability to handle 4 x 5 Speed Graphics or 5 x 7 view cameras is the first prerequisite for still photographers.

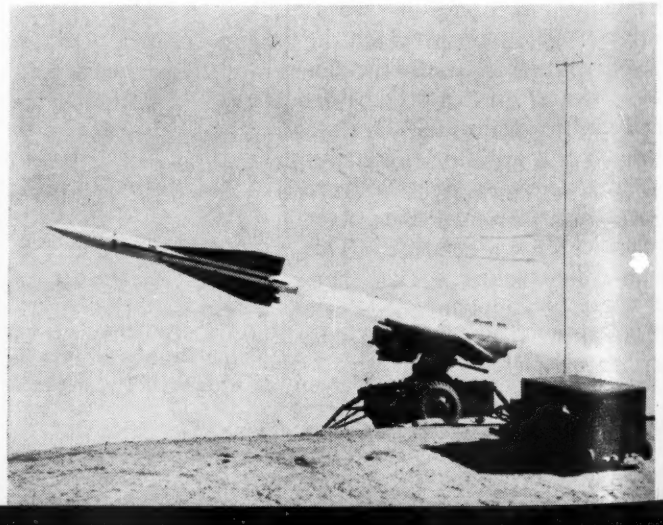
How does a photographer looking for a job with the Air Force gain experience? One splendid training ground is in the photo services department of private companies where scientific research is carried on. Usually he will get a crack at learning some of the same techniques practiced in the Air Force. The novice might also offer his services as a civilian to the armed forces photography branches as a student employee.

The Society of Photographic Instrumentation Engineers offers a course in engineering and instrumentation photography at the Los Angeles branch of the University of California. These and similar courses given at other schools are of value to the photographer starting out. In addition, several camera manufacturers have prepared excellent reports and books on scientific photography.

At the moment, openings for photographers in the Air Force are not too numerous. However, at Edwards we believe the photographer's slot is one worth working for and waiting for. □

TWO Air Force photographers teamed up to photograph the HAWK missile fired from a mobile type launcher . . .

The shots were carefully planned, with one cameraman stationed to the left of the HAWK, the other to the right.



RAYTHEON

continued from page 51

withstand we (1) taped a sheet to the floor to be walked on and rolled over by a swivel chair, (2) baked a sheet in an oven and immediately subjected it to extreme cold, (3) poured scalding coffee on a drawing and let it stand for two hours. Result? After a soap-and-water washing, the drawings were still reproducible and the "engineered" surface and pencil lines were still intact and legible.

The tests convinced the Drafting Practices Committee that we had found the answer to our problem. The committee in turn convinced top management that the film was the most economical medium for our drafting room, although its initial cost is about four times that of good tracing paper.

Aside from eliminating redraws, the new technique has brought several other benefits. Quality of reproduction has greatly improved. We know that all our prints will be sharp and crisp, regardless of whether we have to make one or 500 from the same drawing.

Another benefit is obtained in fulfilling the requirement of our military contracts, which state that reproducible master copies must be supplied to the Government. Raytheon's Missile Systems Division is prime contractor on the U.S. Army surface-to-air HAWK, as well as the U.S. Navy air-to-air SPARROW III missile now operational with the 6th and 7th Fleets.

With tracing paper this supply requirement was difficult because of the condition of the drawings by the time the job was released, necessitating a file of secondary master sepias of the originals for every-day reproduction purposes. By using the new materials, drawings made at the outset of a project are still in perfect condition when final plans are filed with the Government, even though they were used every day for normal reproduction purposes.

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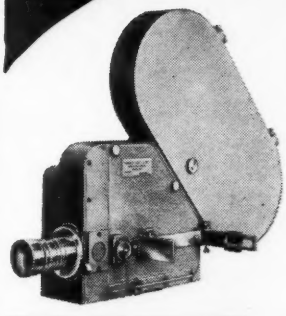

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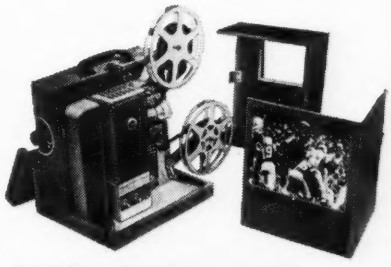

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They Make the Complex Clear

Ramo Woolridge's moviemen have to explain computers.

by JAMES HUGHES
Executive Editor

Among the companies which captured awards in this year's INDUSTRIAL PHOTOGRAPHY film competition was Thompson Ramo Woolridge Inc. Its film, "All About Polymorphics," won the approval of our judges because it explained a most complex subject — computer design — clearly and in a novel and entertaining fashion.

Since its formation in 1956, the in-plant film department of Ramo-Woolridge, a division of Thompson Ramo Woolridge, has become exceedingly adept at accomplishing this sort of thing, as well as at producing more routine progress-report and public relations films.

The small — five man — staff performs all production services from script to release print, yet it manages to average about 11 productions annually. There is some assistance, particularly in art direction, from other departments. Naturally, everybody doubles in brass.

The shortest films done by the group are three minutes, the longest 31 minutes. Under ideal conditions, one-reel 10-minute films can be produced in a six-week period.

Much of the content of progress report films is shot in Ramo-Woolridge laboratory space; occasionally, however, location trips are necessary to the sites of remote radar equipment or to various military installations. Location trips have also been made to refineries in the Los Angeles area and to the laboratories and manufacturing plant of Ramo-Woolridge in Denver.

Cinematic Values

The responsibility of the motion picture unit covers primarily cinematic values. Film assignments stem from a Ramo-Woolridge development project or from a Thompson Ramo Woolridge division or subsidiary, which is responsible for accuracy of technical content and for determining the type of treatment appropriate.

The first steps in the making of a film are to have the screen writer confer with the responsible technical people and to have some one person appointed technical advisor to the motion picture group. The script is prepared from reports, drawings, manuals, specifications and information gathered from conferences with scientists and engineers who are responsible for the work being reported.

Every effort is made to have the script approved before shooting begins. This is not always possible, since shipping deadlines for equipment and other sorts of contingencies may make it necessary to shoot before the script is available.

Film is reviewed in the rough-

assembly stage without sound and then at the interlock stage before a composite print is made. It is very rare that changes of any sort are made after the interlock showing. Narration of Ramo-Woolridge films is usually done by performers from Los Angeles TV or movie studios.

Ramo-Woolridge is sold on color, so 95% of its productions are filmed in Commercial Ektachrome. "The impact of color," says Jack R. Smith, unit supervisor, "justifies the increased cost. Actually, the increase in total production costs is not significant—approximately 15%. Most of the increase in cost goes for release prints. Considering only the cost of raw stock, printing and developing, color prints run about 50% higher than black-and-white."

The unit's compact motion picture studio is located in Ramo-Woolridge buildings in Canoga Park, in the west San Fernando Valley. In a 900 square-foot area are a shooting stage, storage area, editing rooms, preview room, projection room and sound-recording room. The facility was specially laid out with soundproofing, air-conditioning and non-parallel walls.

As a service function the motion picture unit handles projection for security indoctrination, general employee indoctrination, scientific information for the engineering division and presentations for customers.

The motion picture group also administers the company film library. One hundred and thirty five prints resulting from 28 film projects are available for loan to company divisions, schools, libraries and other interested organizations. The library also contains about 120,000 feet of stock footage.

With a movie-making facility on hand on an in-plant basis, Ramo-Woolridge is in a position to derive the advantages of an added dimension in recording its research and development progress and its over-all operational activity, while also providing for public relations needs. □

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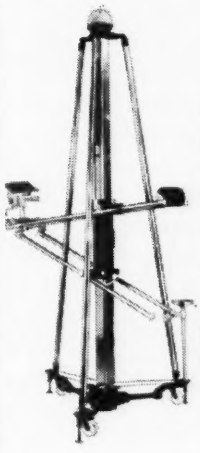

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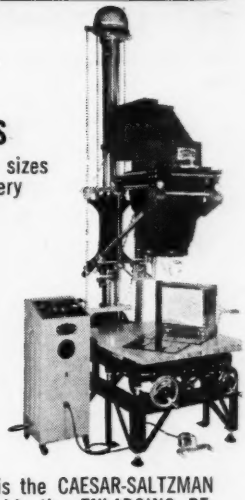

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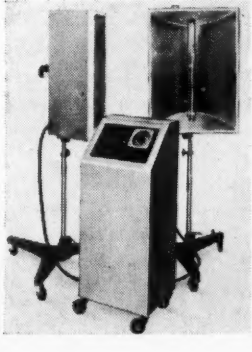

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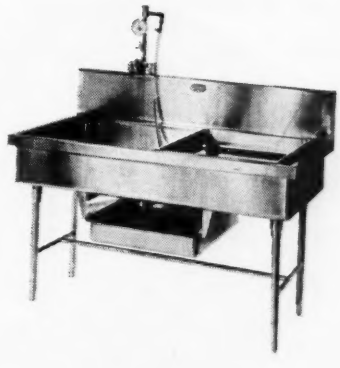

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INSTRUMENTATION

continued from page 18

results indicate a significant increase in contrast and darkening at higher intensities. The trend at low intensities indicated real increase in speed, not just increased gamma.

Figure 2

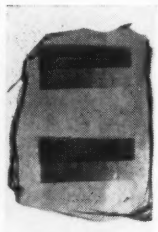

Figure 3

Figures 2 and 3 of the paper show the effect of purposely making electrodes in which strips of conductive coating were removed. The enhanced darkening in the high field portions was very marked in the original emulsions, but did not show up well in the reproductions for publication. The greater contrast, and the numerous dark spots, which might be incipient breakdown, at 1,500 volts as compared to 1,000 volts, is noteworthy.

What might these pioneering experiments lead to? One would certainly expect to find information of scientific importance about the photographic process itself to grow out of a continuation of these experiments. Many interesting practical possibilities also suggest themselves. In particular, the possibility of an electrical rather than a mechanical shutter immediately arises, for which shutter speed limitations would become virtually nonexistent. It may be possible to develop emulsions responsive to light only when an electrical pulse is applied to them. The problem of synchronization in high speed photography and achievement of high speed cinematography would be simplified with pulse sensitization. The synchronization of flash tubes and pulsed films would be particularly easy to accomplish. One might even use a single power supply for both. Pulsed sensitization of films in radiography in general and flash radiography in particular should be very useful. Increased speed would reduce medical X-ray exposure. Military applications such as reconnaissance, particularly at night, could benefit from pulse sensitization. □

"You must be exhausted, Charlie. You've been breathing all day."

Megalume

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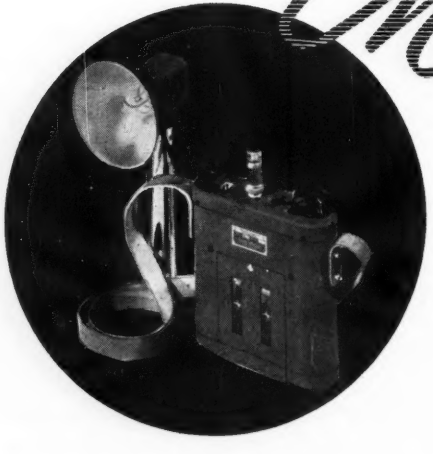

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REPRO MANAGER

continued from page 14

a photographer involved in reproduction you should study the many processes and techniques available in light of your requirements. Pick the one best suited for the job. *Don't build quality in when the need for quality isn't there.*

PHOTO FACILITY PLANNING

Some key points should be kept in mind when organizing or reorganizing a facility.

1. The entire photo facility should be well-illuminated. In many cases, inefficiency in reproduction operations can be attributed to the technician having to examine his work under different lighting conditions.

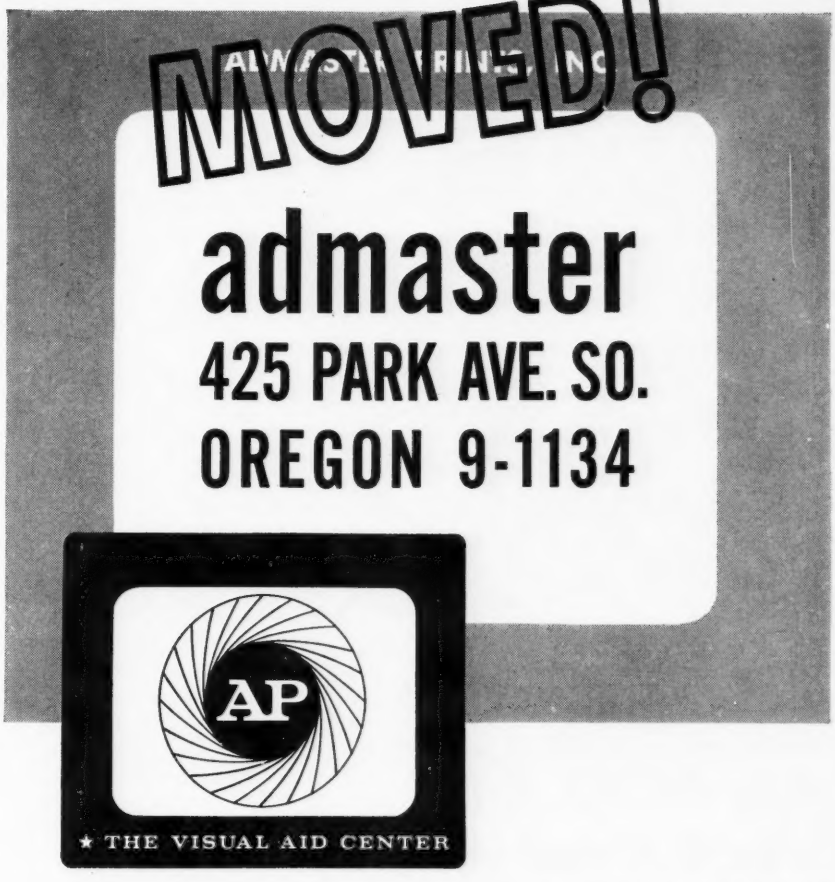
Inspection of negatives and prints, for example, should be done in a darkroom having the same lighting conditions as the finishing room where the negatives and prints are handled in their final stages. What may seem acceptable in the darkroom under one lighting level may be rejected in the finishing room under another lighting level.

Personnel can concentrate on their work more closely and make less errors when illumination is correct.

2. Machinery and working equipment should be located as close as possible to the next operation. For example, photographic printing apparatus should be within close range of developing sinks, and sinks should be close to wash tanks. There should be sufficient room between pieces of equipment for personnel to work without bumping into one another.

3. The area should be planned so that there is a logical flow in sequence operations. For example, the lab could be designed in a horseshoe shape, with work entering at one end and coming out as the finished product at the other, without having to double back, thereby losing time and raising the cost of a job.

4. The area should be layed



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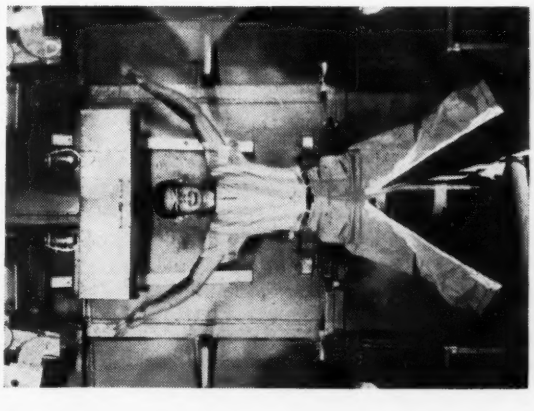

YOU'RE RIGHT. It's a trick shot. If you look closely, you'll find that the top side of the picture is merely a reflection of the bottom side. The photo is of the highly polished interior of a supersonic industrial wind tunnel at the Arnold Engineering Development Center, Tullahoma, Tenn.

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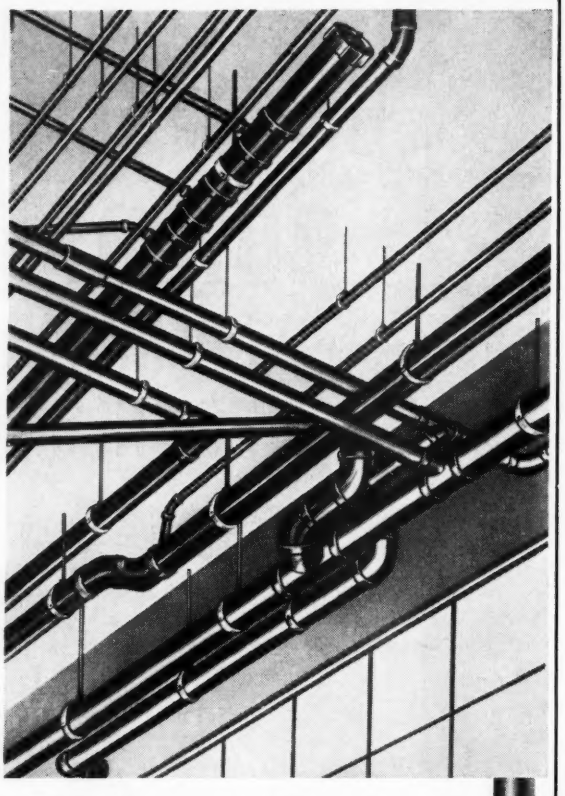

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out with thoughts of future expansion. Keep in mind that an increase in personnel and the addition of new equipment will result in the need for a larger area or more efficient utilization of the present area.

5. Equipment should be utilized to the maximum. There are many cases where one piece of equipment will do many jobs. This equipment should be located near auxiliary apparatus that could be used in conjunction with it, increasing the potential of the equipment.

For example, the accompanying photographs show how a typical piece of equipment — a vacuum frame — is located so it can be used with other nearby units. *Figure 1* shows the frame

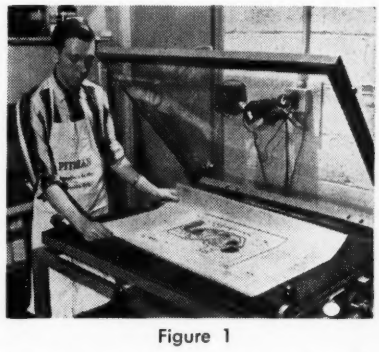

Figure 1

being used in a horizontal position for negative-to-positive transfers of a printed circuit original.

Figure 2 illustrates the same

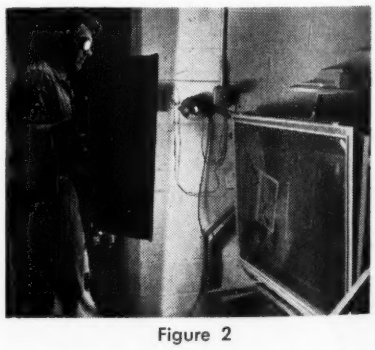

Figure 2

piece of equipment in a vertical position being used for autopositive printing in conjunction with a nearby arc lamp.

Figure 3 is a diagram of the unit with auxiliary equipment. The arrow marked "1" is a recessed lighting fixture, which produces high intensity wide-beam illumination for reflex

printing or conventional contact printing. The arrow marked "2" shows another fixture recessed in

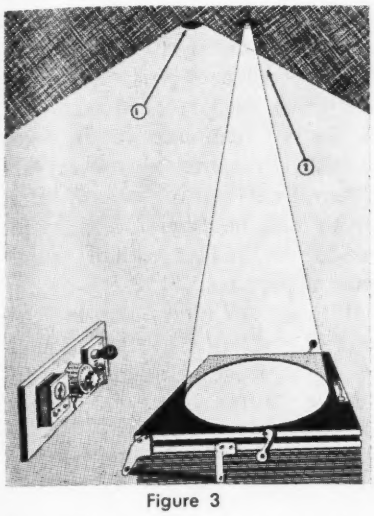

Figure 3

the ceiling. This one is a pinpoint light source for making ultra fineline reproductions.

To the left of the frame is a control panel mounted on the wall that holds a second timer, a voltage regulator, a safelight and an electrical outlet. Either of the two light sources in the ceiling can be used in conjunction with the timer or voltage regulator for making exposures (the voltage regulator is also used for controlling light intensity).

All this equipment is located within a five foot square area. It takes up little room, but yet is so versatile that it can be used for numerous types of reproduction operations. □

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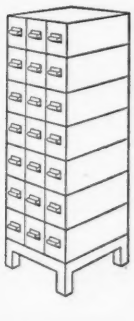

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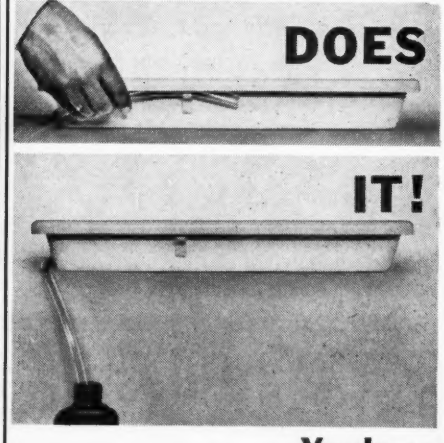

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continued from page 59

frequently used. High-speed pictures are taken in black-and-white, or in color, or on special emulsions, such as infra-red. Most high-speed cameras require no special perforations; however, the dimensional variation of film which can be tolerated is more critical than for normal speed motion pictures.

Filters. All filters used in general photography are also found in high-speed photography. In use are contrast filters, color compensating filters and special effects filters. Generally, coated filters, which permit highest light transmission, are preferred.

Optics. In high-speed photography the complete range of lenses is used. Special lenses have been designed which have extreme speed up to $f/0.7$. A large variety of mirrors, prisms, viewers and telescopes are used in high-speed photography. Some cameras have specially designed optics.

Calculations. In high-speed photography correct exposure depends on more variables than in general photography and has to be calculated more precisely. One must determine the required taking rates to effectively freeze the motion. The object's speed of motion, the film travel and magnification have to be considered. Another important variable factor encountered in high-speed photography is the reciprocity effect (reciprocity law failure of photographic emulsions), which means films do not have the same speed characteristics in high-speed applications as in general photography. □

A Small Error

In our August issue (p. 30) we ran an article on Picatinny Arsenal's Kerr Cell camera. The article contained one slight discrepancy. Effective exposure speed was indicated as one five-billionth of a second; actually it is five billionths of a second.

G.E. EVENDALE

continued from page 23

the diazo-type prints (semi-moist equipment) was unsatisfactory and density varied widely from photo to photo. As a result, the photo inserts provided comparatively little of the particularly important information on the smaller and partly hidden piping and parts on the engine casing.

Second Approach

Recognizing that the diazo-type photo reproduction was unsatisfactory due primarily to variations in the density and contrast in the original negatives and then in the screen positives, it was decided in the second approach to strip the screen positives in on separate vellum sheets so that the exposure time of the diazo-type reproduction machine could be varied to match the density characteristics of each individual negative in a series. Each 8 x 10 photo negative was placed on an 11 x 17 inch vellum sheet (Air Force B size), with each sheet coded for the particular camera position and engine angle. A given engine assembly required an average of 32 separate sheets and, because the individual sheets did not include call-outs, an additional 34" x 120" line drawing sheet for overall assembly views and part numbers. The call-outs were placed on an additional sheet because the density control on diazo-type prints was still insufficient to make all the leader lines and circles around parts sufficiently visible in the prints. Even if both black and white leaders had been used, the wide variation in print density in small areas would have made the photos difficult to read.

Separate diazo-type exposure of the photos was helpful in reducing the density discrepancy between generally "light" or "dark" screen positives but, of course, could do nothing to improve density variations and the lack of contrast within each positive. Dark, dull parts were often

continued on page 77

Audio Visual Bulletin
DA-LITE SCREEN COMPANY

IN THE INTEREST OF INDUSTRIAL AV PROFESSIONALS

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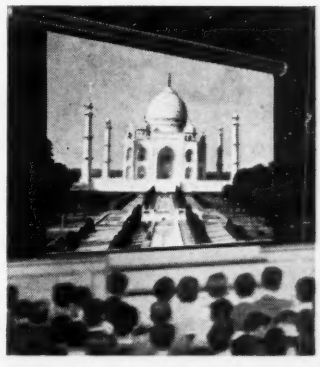

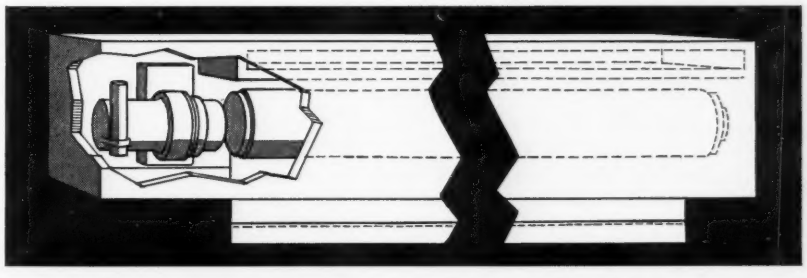

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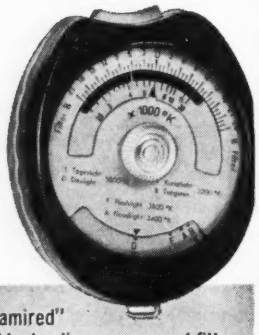

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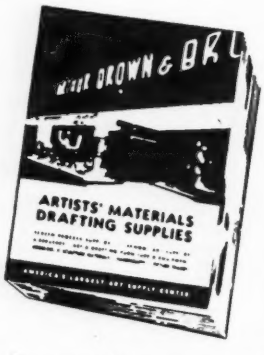

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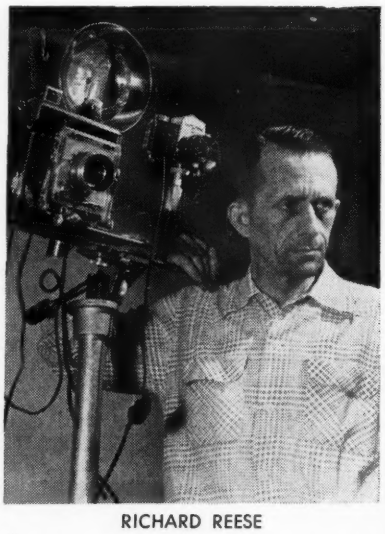
PHOTOGRAPHER IN INDUSTRY:

Lensman in the Lab

A familiar figure in midwestern industrial photographic circles, particularly at scientific gatherings devoted to photo-instrumentation, is Richard Reese, Bjorksten Research Laboratories, Inc.

Like many another industrial photographer, Dick Reese became interested in his future profession while still in high school. In his case the catalyst was exposure to the art of developing

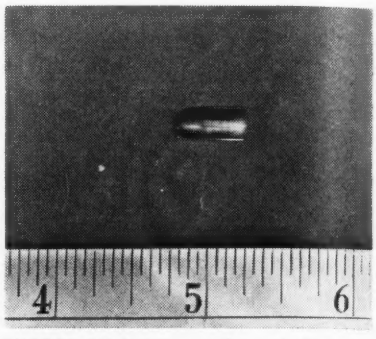


RICHARD REESE

during a chemistry class in his native Madison, Wisconsin. Dick pursued his new interest at Madison's Vocational School and then followed up with University Extension courses in photography and chemistry at the University of Wisconsin.

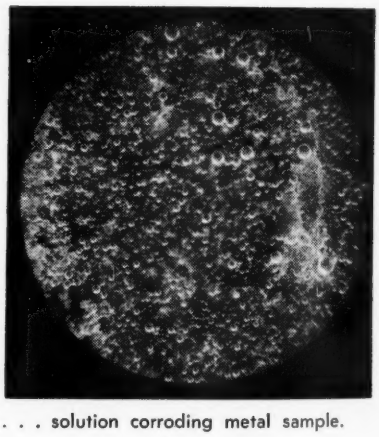
Chemistry, in addition to leading to photography, helped land Dick a job at the University's Biochemistry Department. "The time I spent there," he recalls, "taught me a lot of chemistry, and the exposure to the fascination of research gave my interest in photography a terrific boost." Research, while sidelined for a while during a stint at a commercial house in Madison, is his major interest today.

Bjorksten Labs, a private organization which does research and development on contract, gives him an opportunity at a wide range of projects. The photo department serves all company projects with illustrative, copy, metrical, photomicrographic, motion picture, high-speed and other photographic services.



PHOTOS BY REESE: A flying bullet . . .

An inventor as well as photographer, Dick Reese has several patents which have been granted and others pending.



. . . solution corroding metal sample.

The professional organizations which Dick Reese belongs to indicate his interests: Society of Photographic Scientists and Engineers, Professional Photographers of America, and the Wisconsin Industrial Photographers Association. He has also participated in the University of Wisconsin's annual "Engineering Photography Institute." Naturally enough, his hobby is —you guessed it —satellite photography. □

G.E. EVENDALE

continued from page 75

located right next to bright, shiny parts on the engine casing. Even though a concerted attempt was made to remove as many shadows as possible during the shooting, there were numerous highlights and dark areas within most negatives. Good detail reproduction was necessary throughout the film area of the screen positive, yet was impossible to obtain with uniform exposure in the contact printer.

Third Approach

The third photodrawing technique solved the basic problem of diazo detail reproduction and eliminated the need for the master line drawing. Manual "dodging" could not be seriously considered as a means to reduce overall density range in the screen positive because the changes in negative density in the crowded photos were too numerous and close together. Even if it had been possible to dodge the negatives manually, we could not justify the extra time required to do an acceptable job.

We decided to obtain contrast control automatically by making the screen positives from the original negatives in a LogEtronic contact printer. This unique electronic printer provides full contrast control in the screen positive film by automatically dodging the original negative at a preselected level. By taking no more time than was formerly required to produce the screen positive in a standard contact printer, we are able to take a single step from negatives with unusually wide density variation and poor detail contrast to a screen positive (Autoscreen) with these characteristics:

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light and dark areas is reproduced clearly to a higher degree of detail contrast.

The third approach comprised 30 photodrawings, each on 17 x 22-inch vellum (size C) but required no supplementary line drawings on a master sheet because the leader lines and call-outs were now placed directly on the LogEtronic screen positive and adjacent vellum. The detail reproduction in the diazotype prints and microfilm blowbacks were satisfactory both to our organization and the Air Force. A great deal of line drawing had been eliminated, with a substantial reduction in reproduction costs, and the system was installed for standard use throughout the department.

Fourth Approach

The high quality of the diazotype reproductions indicated how further improvements in the system could be achieved. First, the superiority of the detail reproduction in each photo was such that we found it possible to reduce the number of photos for a given engine. An assortment of supplementary closeup shots had previously been necessary in order to insure that we accurately recorded details that were not clear in the medium shots. We were able to reduce the average number of photos per engine from 30 to 10 by eliminating the extra closeups. Although more leaders and call-outs are required per photo, the uniform density of the photos has eliminated any confusion in identifying parts.

Because the gross density range of all screen positives for a particular engine were now identical, there was no longer any need to provide for variation in the diazo-type exposure time. Therefore, all photos were again stripped in on a single vellum sheet (as in the first approach in developing the present system). Because of the smaller number of photos for a given engine, it was possible to place all photos and call-outs on the present 34- x 44-inch (size E) standard vellum sheet. A single sheet is more convenient to use and required less space for storage, and a whole set of photos can be reproduced in the diazotype machine at a lower total cost. A revision can be made easily by reshooting the particular photograph that includes the change, processing the original negative and screen positive, stripping the positive film into the existing photo sheet and scrapping the obsolete view.

The present photodrawing system has for the last year produced a 20-to-1 reduction in cost. While this is certainly significant, the greater amount of information presented alone has justified the change. □

Thomas E. Ware is Supervisor of Photography in the Large Jet Engine Department of the General Electric Company at Evendale, Ohio.

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FLYING TV

continued from page 57

the fact that the separation of the warhead and subsequent flight of the TV capsule would be in camera range for approximately 30 seconds, and the minimum speed at which the action could be photographed was 64 fps. These two factors indicated the need for a camera with a 50-foot film capacity; Traid's TKB-3A was selected for the booster camera and the aft-viewing camera pod camera.

The remaining pod camera, which would view the capsule ejection mechanism, had to be of relative high frame rate but accommodated in a pod nine inches in diameter. The camera meeting the minimum framing speed (400 fps) and the size and weight limitations was the D.B. Milliken DBM-3.

Since the DBM-3 would be viewing the interior of the warhead, lighting had to be provided that would illuminate the subject during an exposure time of 1/2000 second. Portable, battery-operated floods were considered but rejected because of vibrations, G loadings and weight and space limitations. Our final selection was to use Sylvania FF-33 flood flash lamps in series. Eight of these lamps embedded in styrofoam shock mountings and fired at 1.25-second intervals proved to give a high-source of illumination over a 10-second period, the running time of the DBM-3. The action to be photographed would be completed within one-half second but the additional run was desired in case of a malfunction.

On the initial flight, all cameras were equipped with 10mm Angenieux wide-angle lenses, giving 41.1° vertical and 55.3° horizontal coverage. The first flight held many mysteries, and the wide-angle lens was the only way to assure maximum coverage time if the objects being tracked drifted excessively. After the first flight, films from the Traid cam-

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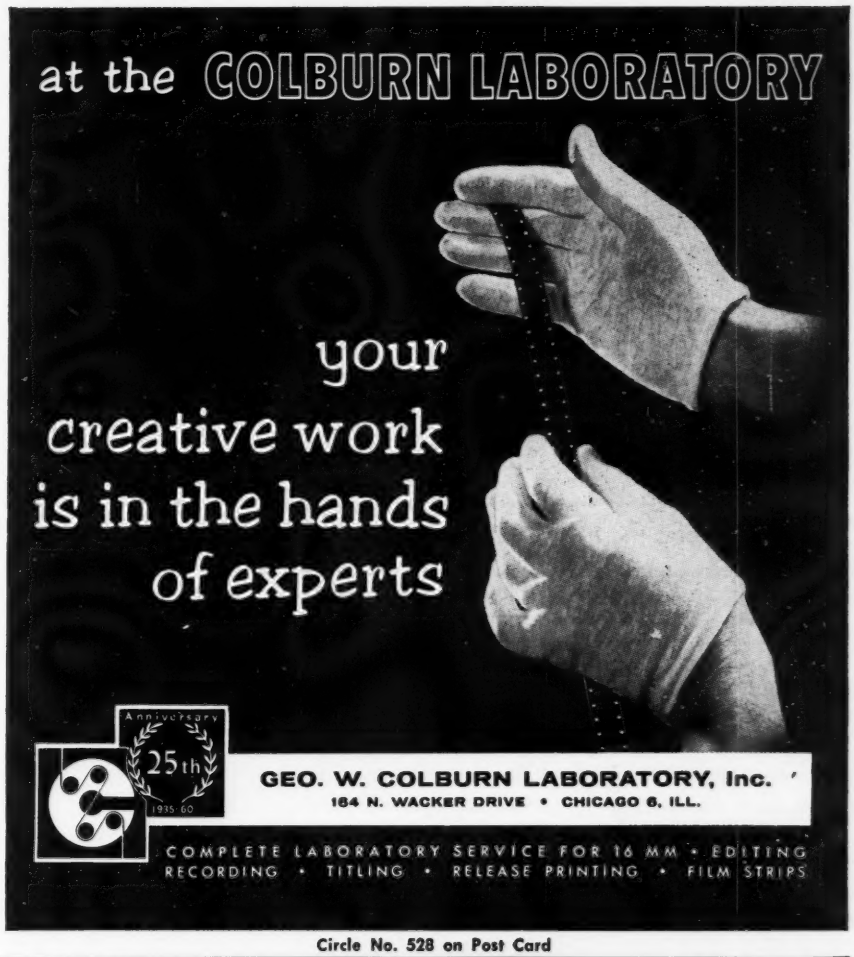
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by DOROTHY EFINGER, Editorial Assistant

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Photographic Items 201

Edmund Scientific Co. 128-page catalog lists magnifiers, illuminators, projection sets, lenses, optical apparatus.

Better Pictures 202

Burke & James, Inc. Booklet on the operation and uses of the commercial view camera.

Ingenious Lenses 209

Kling Photo Corp. Folder about the Kilfitt Makro-Kilar lenses which permit a photographer to focus from infinity down to inches from a subject.

Shutter Release 203

De Groff Labs. Flyer titled "Why be Chained to your Camera" describes available shutter releases.

Studio Outfit 204

Doyle Riley Co. Data on the Noba Model 5, a studio outfit with camera, stand, 5 x 7 back.

Photo Equipment Guide 205

J. G. Saltzman, Inc. 47-page catalog deals with photographic instruments and equipment.

Cameras and Accessories 206

Yashica. Illustrated brochure about Yashica cameras and accessories (prices included).

Film Holders and Repairs 207

Hoffman Professional Camera Company. Brochure on film holders and repairs, bellows and slides.

156" Wide Paper 208

Bulkley Dunton & Co. Information about extra-wide seamless paper for background and display.

Tripod Head 210

Miller Professional Equipment. Literature on fluid action tripod head which requires no adaptors.

Lenses 211

Bausch & Lomb Optical Co. Descriptive sheet on Baltar lenses for 16mm cinematography.

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Weston Instrument Co. Data on the well-known Weston Master III exposure meter.

Background Roller 213

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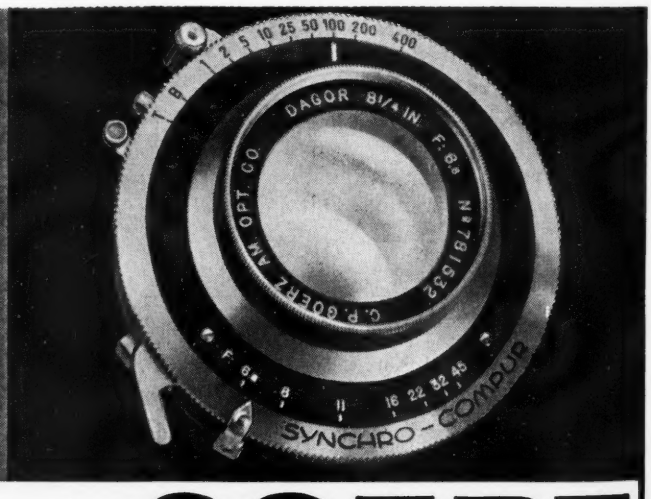

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cameras, arc lamps, carbons, vacuum printers, and many other items.

Whiteprinter **274**

Copymation, Inc. Folder about the Lancer "Special," a high-speed whiteprinter.

Colight **275**

Colwell Litho Products, Inc. Illustrated catalog on complete line of developing and offset equipment.

Arc Lamps **276**

Strong Electric Corp. Literature on Grafarc and Challenger fully automatic high intensity arc lamps.

INSTRUMENTATION

Lithographic Ink **277**

Polychrome Corp. "A Reference Guide to Lithographic Ink" describes properties of litho ink.

70mm Sequence Camera **278**

Charles A. Hulcher Co. Description of the Model 102 camera which produces negatives at rates of 5-20 frames per second.

Data Recorders **279**

Vought Camera Co. Folder on photographic data recorders for aircraft and missile evaluations.

LIGHTING

Electronic Flash Unit **280**

HICO. Literature describing new HICO 200-watt second electronic flash unit.

Light Unit **281**

Lowel-Light Photo Engineering. Data on new light unit which eliminates booms and complicated rigging.

Idealite **282**

Ideax Corporation. Description of heatless illuminator for viewing transparencies, displaying, opaquing.

Stage and Studio Lighting **283**

Times Square Stage Lighting Co. Catalog describes complete line of studio and stage lighting equipment.

Reconditioning Process **284**

Quartz Radiation Corp. Complete details about the Nu-Life reconditioning process which restores burned or worn-out mercury vapor lamps.

VIEWERS, PROJECTORS, SCREENS, SLIDES

Projection Stand **285**

Cousino, Inc. Folder on the "Quiet Top" projection table which muffles vibrations.

Portable Projector **286**

Buttafarri Corp. Information about the Fer-Color 6-6 Projector, which features a 12x12" built-in screen.

Slide Maker **287**

Tecnifax Corp. Directions for making your own Diazochrome multicolored slides for overhead projection.

Visual Sales Aids **288**

Camera Optics Corp. Literature on the C.O.C. Executive, a projection table viewer.

Projector **289**

Spindler & Sauppe, Inc. Description of Selectroslide, a projector which has been known to make 4 million slide changes without servicing.

Motion Picture Viewer **290**

Hudson Photographic Industries, Inc. Data on the Previewer-8, a hand-held compact action viewer.

Superwide Projection Lens **291**

Buhl Optical Co. Flyer describes Series 400 lens system which gives big screen pictures.

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Technical Animations. Description of Technamation, a process that

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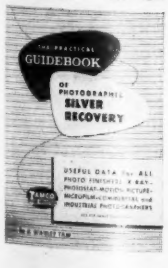

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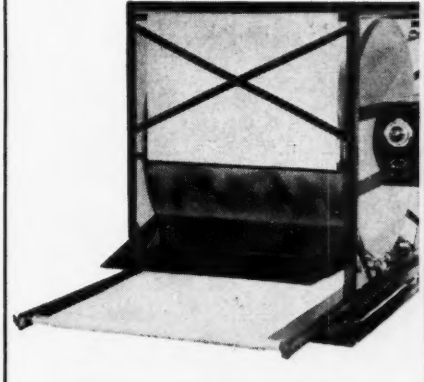

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Slide Cabinets **293**

Multiplex Display Fixture Co. Brochure describes all-steel slide cabinets which provide the right kind of visible filing space.

MISCELLANEOUS

Magnifiers **294**

Edroy Products Co. Circular dealing with binoculars and all-purpose, folding magnifiers.

Boardmaster Visual Control **295**

Graphic Systems. 24-page booklet describes boardmaster visual control system.

ROUNDTABLE

continued from page 8

achieves within his company, he should continue to be what he knows best — a photographer. Too many photographers who received some executive recognition in industry have been hurt because they did not understand this important fact. A photographer's real value to his company lies in his specialty and only in his specialty. Many firms are hesitant about putting a photographer in charge of a photographic organization for fear of losing a good mechanic and gaining a so-so executive. This is the reason why so many photo departments are headed by engineers, accountants or public relations men.

By sticking to what he knows best; by not playing the other fellow's game; by making photography work for his company, the photographer will build a sound and healthy demand for photography.

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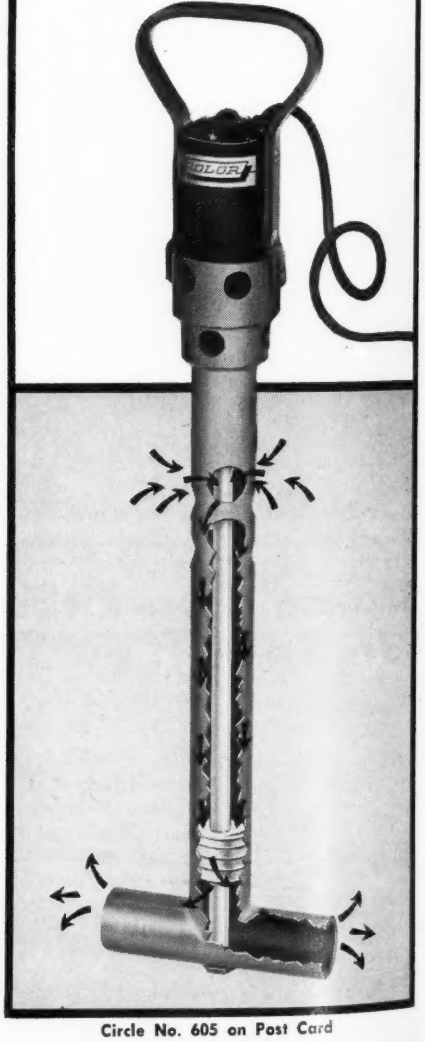

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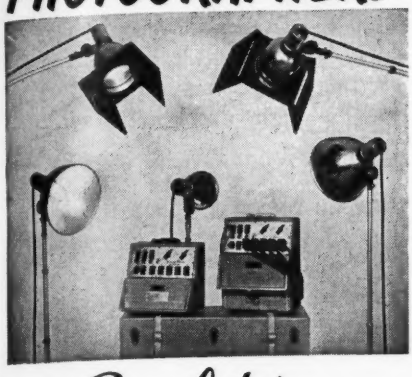

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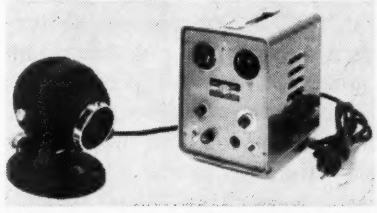
NEW PRODUCTS

continued from page 62

working parts are made of hardened steel to withstand indefinite wear. A full size handle with rubber grip is offset for either right- or left-handed operation. Price: $150.00.

Flash Illuminator 108

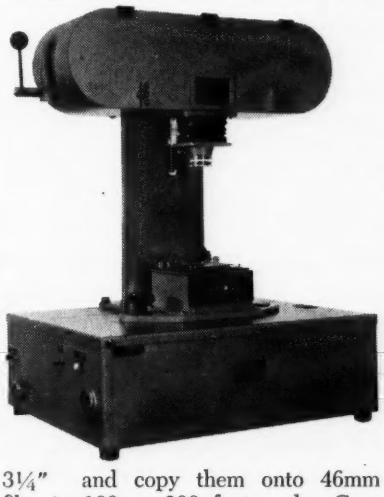
Edgerton, Germeshausen & Grier Inc., has developed a new electronic flash illuminator for making extreme close-ups of small and microscopic subjects. Light from the lamp can be imaged on the subject by a conventional condensing lens or by direct



radiation from the lamp, which is held in a special glass-insulated holder. A built-in tungsten "modeling" lamp permits focusing and optical line-up. The duration of each flash is 150 microseconds with a 100 w-s output. The flashtube, along with two output limiting resistors, are mounted in a modified American Optical Model 735 lamphouse.

Negative Printer 110

Quantity production of color negatives from transparencies is now easier with the Emby-Homrich Printer, introduced by *Emby Photo and Film Machine Co.* The printer will handle transparencies from stereo to 2¼" x



3¼" and copy them onto 46mm film in 100 or 200 foot rools. Controls have been simplified so as to be "idiot-proof" and include mirror shutter reflex action for visual image check, automatically adjusted film advance and an enlarge control.

Tripod Legs 111

A special groove design has now

continued on page 87

70mm PULSE
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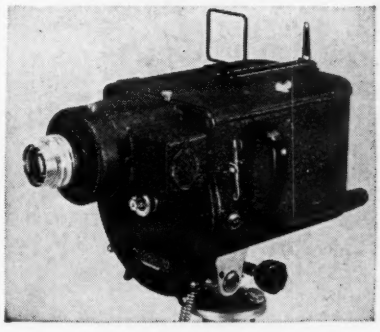

The Hulcher 70, Model 102 camera is available for remote or local pulse operation by hand or programmed switch, at rates up to 5 per second and simply by flipping a switch, the camera will operate at 10 f.p.s. sequence with same preset exposure. It can also be immediately switched back to pulse operation. Pulse system is complete, requiring only an external switch. Shutter speeds range from 1/50th to 1/1440th of a second for pulse operation. The same camera still operates at sequence rates from 5 to 20 per second. A wide range of lenses with reflex focusing are available. Camera is available for use with 12, 24 or 115 volts.

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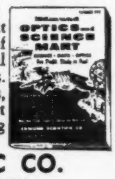

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FLYING TV

continued from page 79

era tracking the capsule flight revealed that the capsule remained fairly well centered in the frame until film exhaustion. For the TV capsule tracking operation on the remaining flights, it was decided to go to a longer focal length and thereby have a larger image size; therefore, the camera pod Traid camera lens was changed to a one-inch B & H Super Chromat lens. The 10-mm focal length was satisfactory on all counts for the thrust unit camera and the Milliken.

To reduce the weight in the capsule and to make the cameras more durable, as many "unnecessary" moving parts as possible were removed from the cameras. The overrun control on the Traid cameras was removed, and the adjustable shutter and shutter control were removed and replaced by a fixed-opening shutter disc.

Exposure settings for photographing an object 50 miles above the earth were unknown. At 64 fps the Traid cameras gave an exposure duration of 1/400 second, which was considered the minimum speed for the action anticipated and the maximum speed for using color film. At 400 fps, the Milliken exposure time was 1/2000 second.

A very unscientific approach was taken to calculate the exposure settings. The day before the cameras were installed was a clear day with a deep blue sky devoid of haze and clouds. Incident meter readings were taken with a Norwood meter at 9 and 10 a.m. and again at 12 noon. These readings were averaged, and a basic exposure was determined by applying the Kodak rule to decrease 1 stop for bright sun on snow. Then, on the assumption that sunlight intensity up above the atmosphere would be noticeably increased, another decrease in lens stop was estimated.

Film selected for the two exterior-viewing Traid cameras was Kodak Ektachrome Commercial. The thrust unit Traid camera carried a Kodak No. 85B conversion filter, and the exposure was set for 1/400 second at *f*/5.6 on the first flight and *f*/3.0 on the final flight. The camera pod Traid camera carried a Harrison C-6 conversion filter on the last three flights, since the capsule was back lighted by the sun, and excessive blues had been picked up on the initial flight. The exposure setting for this camera was 1/400 second at *f*/4.0. The Milliken camera was loaded with Du-Pont 931A Rapid Reversal film (processed to negative). Illumination for the Milliken was provided by the Sylvania FF-33 flood flash lamps, and the camera was set for an exposure of 1/2000 second at *f*/5.6 on all flights.

Films for all flights were given normal processing, since exposure calculations had been based on film guide numbers recommended by the manufacturer. The Ektachrome Commercial was processed by Eastman Kodak Processing Laboratories in both Los Angeles and Chicago. One roll of the 931 A was processed by the White Sands Missile Range motion picture laboratory, and the remaining rolls were processed by the George W. Colburn Laboratory in Chicago.

The first missile was fired in January of 1960 and the fourth and final in June of 1960. The camera pod was recovered in all four firings, and the rocket booster camera was recovered from three firings. Apparently the booster containing the unrecovered camera completely disintegrated upon reentry, and the camera box probably lies buried under the sands of the desert at the Missile Range.

The same camera pod and the same two cameras, the DBM-3 and one TKB-3A, made four successful flights as a unit. The camera pod was ejected from the warhead at an altitude of approximately 50 miles and free fell to approximately 10,000 feet, at which altitude the mortar-activated parachute was de-

continued on page 97

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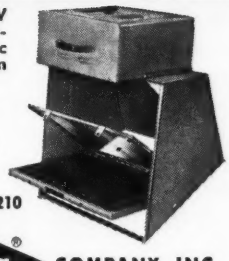

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NEW PRODUCTS

continued from page 85

been incorporated to all Ceco Pro Jr. tripods to provide greater rigidity. *The Camera Equipment Co.* is now supplying these new legs, which are

claimed to provide twice the gripping surface of wood to wood. The outside of the leg has a modern rounded shape, which adds strength and durability to the wood. All the legs are equipped with double knob-leg locks to apply equal pressure on each leg to prevent slipping.

Automatic Land Camera 112

The *Polaroid* Land System has been further refined with the introduction of the new Model 900 camera, which offers several advanced features. Previously, automation was available as an accessory in the form of the automatic shutter, which fit on the front of most Polaroid cameras. Now, a micro-eye shutter system is built-in to the #900 and sets the lens opening and shutter speed simultaneously. The eye, which is said to have extraordinary sensitivity, is powered by a mercury cell good for years of use. Another innovation is the coupled rangefinder viewfinder in one window with illuminated parallax correcting frame. Price: $159.95.

Photogravure Contact Screen 115

The Eastman Kodak Co. has announced a Magenta Contact Screen intended primarily for the color field. This new screen for photogravure is said to provide an accurate and fast method for producing high quality hard dot screen positives for gravure printing. Lateral dot information in addition to improved tone reproduction and excellent sharpness are other features of the screen. The new screen is available in one screen angle and in sizes from 8" x 10" to 29" x 29."

Print Filing Equipment 113

Plan Hold Corp. has available several systems for neatly filing work

continued on page 94

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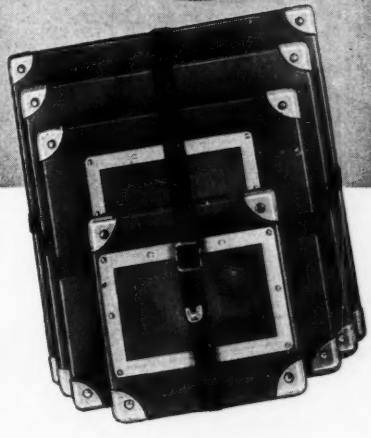

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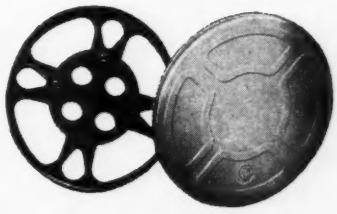

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The following is from "A Reference Guide to Lithographic Ink" by Irving J. Simmons. It is distributed free of charge by the Chromatone Printing Ink Company.

Color is probably the most important single property of a printing ink, for in the final analysis, it is what is being purchased by the customer and what is ultimately observed in the finished job.

The color of printing inks manifests itself in three tonal values: *mass tone, top tone* and *undertone*. Loosely defined, mass tone is the color of the ink when observed in the mass state in the ink can. The top tone of a color is seen when the ink is tapped out on a sheet of paper or printed in a relatively heavy film, such as in letterpress printing. Undertone is the shade or color value obtained when the ink is deposited in a thin film. Since in offset lithography, we have a printing system whereby ink is finally transferred to the sheet in the finest film, it is said that offset inks print with the undertone. (It is for this reason that offset inks possess much higher tinctorial strength than inks for other printing processes.)

Mass Tone Deceptive

Too often a pressman will open a can of ink and decide from its appearance in the mass state that it could not possibly produce the color which was ordered. Either he requires special reasurance from his ink manufacturer, or he proceeds in spite of his skepticism and is pleasantly surprised by the final results. This is because there may be a vast difference in appearance between mass tone and undertone.

Spare Runs Cleaner

When we lay down a heavy film by the offset process, we are bringing in some of the top tone, which could account for a considerable difference in shade, particularly in certain ink colors. Most reds, for example, when printed sparsely are much colder or bluer than when they are laid down in a heavier film. It is also true that colors print much cleaner when run spare, and differences in tonal values thereby become apparent. This is particularly evident in the case of the more transparent colors. Frequently, a lithographer is expected to match a letterpress color using the offset process. In some cases this is virtually impossible since letterpress colors obtain their depth or strength from the thickness of the printed film.

Opaque and Transparent Inks

Opaque inks have greater "hiding" qualities; underlying colors can be concealed in some measure, depending upon the degree of the ink's opacity. In multicolor printing, where there is overlapping of colors, it is frequently desirable that the underlying colors show through more clearly. In this case it is essential that the most transparent inks be used. The transparency of an ink

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may be determined in advance by tapping it out in a fine film over a contrasting background.

Process Inks. Process inks must have special characteristics such as maximum transparency, cleanliness of color and tinctorial strength. The red is usually of the bluer or colder type and the blue towards the peacock shade. If the yellow is the first color down, it need not necessarily be transparent. But it is the cleanliness and strength of process inks which contribute in the final result to the brilliancy of the greens, purples, reds, etc.

Pressmen can do their own color blending whenever necessary. They can add yellow to red and make it warmer, blue to green to make it deeper, black to brown to make it darker. Blue and yellow may be combined to produce green; or blue and red for purple; or red, yellow and black for brown. An infinite number of shades can be achieved and effort along these lines can have practical value.

For producing tints and pastel colors, a base white should be prepared first by combining equal parts of opaque and transparent white. The color can then be introduced (always starting with a small quantity) and a small amount of binding varnish and cobalt drier added. A standard red can be used for pink, a standard blue for blue pastel, purple for lavender, etc., etc. □

Veterans Group Canvasses for Photographic Supplies

The 52 Association, an organization providing hobby materials for veterans hospitals all over the U.S., needs contributions of photo supplies, books and equipment. Robert Frost of the association points out that "Photography has great therapeutic value to these hospitalized men since even the most disabled can participate." Contributions should be addressed to Hobbies for the Wounded, 52 Association of N.Y., Inc., 226 W. 48 St., N.Y. 36, N.Y.

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It is true that you can project better pictures in darkened rooms—but there are many times when room darkening is inconvenient, difficult and costly. Now, with the new Radiant exclusive "truly lenticular" screen, which controls **both** horizontal and vertical light reflection, you can project slides and movies effectively in normally or partially lighted rooms where no unusual lighting conditions prevail. For industry and business—this permits projection in shows, conventions and offices where room darkening is not practical.

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Check Your Negs for Clarity

by H. R. VERRY

The quality of a copy print by any method is determined chiefly by the quality of the original document. If the original is of poor quality, it is difficult to make a better copy, especially by automatic means.

With microfilm, the negative is also important. A good original can be badly reproduced if the negative is incorrectly focused, exposed or developed, or if poor apparatus has been used.

It is for this reason that the wider use of microfilm as a method of making document copies will require more serious consideration being given to the preparation of the negative if the best possible results are required. Much depends on the skill of the operator, but the quality of the apparatus used is equally important.

Unfortunately for copy making, the continuous type of camera is able to make extreme reductions which must result in poor definition if this film is re-enlarged to a reasonable size on paper. It cannot be too strongly emphasized that when the film is to be used to provide paper prints, the reduction ratio should be kept as low as possible. Unless the original is in bold black type, over a 12:1 reduction may restrict the quality of the final copy. Before making the microfilm, it is well to remember that the production of paper copies which cannot be easily read by the user is a complete waste of time, money and energy. If microfilm is worth doing, it is worth doing well. Economies made by filming at extreme reductions are unrealistic. Anything which is unsuitable for the purpose for which it is required is expensive, no matter how small its original cost may have been.

To obtain good quality film and paper copies, lenses capable of giving extremely good definition are required, both to record and to enlarge the image. They should be free from certain aberrations common in many types of lenses and also coated to reduce faults. They should be used at the aperture recommended by the maker, which will give maximum definition over the whole of the image. No lens is optically perfect, but for this work one is required which will be capable of recording fine lines at both the center and the edges of the film or the copy.

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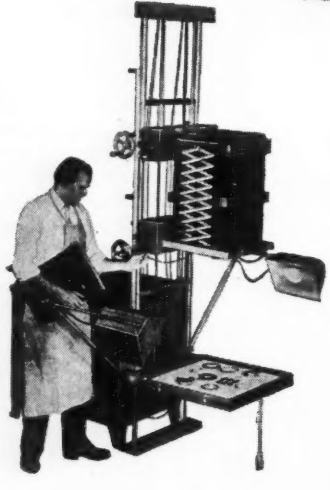

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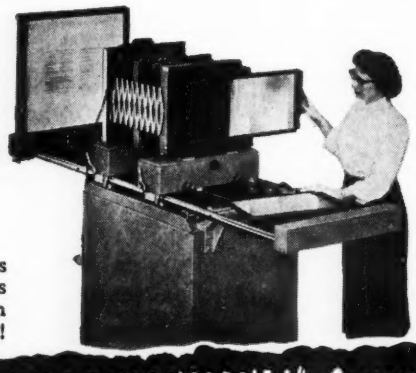

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may contribute to lack of sharpness or legibility. Dust, dirt or a smoky coating on the lens, or vibration during exposure will ruin good definition.

A method of lens testing for cleanliness which is strongly recommended is to use a semi-point light source, such as a pen flashlight. This should be held about six inches beneath the center of the lens in a darkened room. With the eye slightly off axis so that the light source is not seen, the lens surface is examined. Any dust or fingerprints will glow against the dark background and indicate whether it requires cleaning or otherwise.

The high contrast material used for microfilm requires an exposure which is somewhat critical if good definition is to be obtained from the film. The film should also have high resolving power, good image sharpness and a fine grain emulsion. These are readily available, but a few careful tests with different film repay the time involved and will indicate those most suitable for this purpose. The importance of correct exposure cannot be overstated. It is particularly critical on low contrast subjects, such as carbon copies, pencil drawings and similar originals. Such documents generally require less exposure than those having a good black text. The blind use of the photoelectric meter can never provide the best results. All meters should be used with intelligence based on experience and careful observation.

In making the paper copies, it is essential to see that the machine is in perfect order, and that the exposure and other operations are as faultless as it is possible to make them. The conditions for making a print are not as critical as those required for the negative, but care is essential. Many a good negative has been badly printed and caused irreparable harm to the microfilm method.

The above is a condensation of an article which appeared in the January 2, 1959 issue of "The British Journal of Photography."

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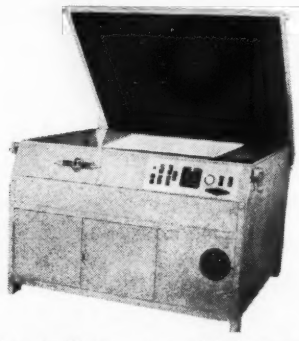

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Briefs

JILL ENGLISH, Assistant Editor

Rocket-Riding Movie Camera

A 16MM SPACE CAMERA designed by ACR Electronics and GE is displayed by Dave Rush (l), president of ACR, on a recent Dave Garroway show. Snug in its data capsule, the camera recorded the earth and the sun from an Atlas missile.

Eastman Rollfilm Inventor? "Nyet," Says Soviet Prof; Claims Soviet Did It First

In a recent issue of *U.S. Camera* magazine Assistant Professor E. Yofis of the Russian All-Union State Institute of Cinematography claims that a Russian invented flexible photographic film prior to George Eastman.

In the article, which deals with professional photography in Russia, Yofis states that "I. Boldyrev showed a flexible film at the All-Russia Industrial Exhibition in Moscow a few years before the Eastman Kodak Company began to produce a similar material."

Telephone Company Produces Films for Classroom Work

Two new sound motion pictures for use in college science and engineering classes have just been produced by Bell Telephone Laboratories. The first, titled "Memory Devices," is a narration film which shows information storage devices used in modern computing machine memories and explains how binary information is stored in them. Basic concepts and terms are explained and examples of mechanical, electromechanical, magnetic, electrostatic and photographic memories are described.

"Similarities in Wave Behavior" is a demonstration-lecture by Dr. J. N. Shive of Bell Laboratories. He discusses the similarities that exist in the behavior of waves in various mechanical, electrical, acoustical and optical wave systems. Using specially-

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built torsion wave machines, he demonstrates the reflection of waves from free and clamped terminations.

These plus other films and filmstrips produced by the company are designed for classroom use and are available on loan.

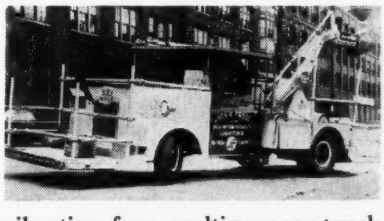
Nixon Shakes GOP Hands; Rapid Camera Records Feat

Presidential nominee Richard Nixon undertook to have his picture taken with each of the 2,662 delegates attending the Republican convention in Chicago this summer. To record the handshakes John Mendicino used a Beattie camera which takes pictures at six-second intervals. Its magazine provides for 1,600 exposures without reloading.

Within two days all the photos were made. These were mailed to delegates' local newspapers.

Special Tires Solve Vibration Problems

Outsize flotation tires are helping to solve a long-time motion picture problem, namely obtaining a vibration-free ride under loads varying from 1000 to 3500 pounds in a standard camera truck. Until recently the only way to solve the problem was to custom build and spring individual trucks to handle specific types of equipment. Now a camera truck that is claimed to be the first



vibration-free, multipurpose truck for moviemen has been developed by the Jack Frost Electric Company. The truck, a basic GMC one-ton chassis, uses airplane-type and flotation tires and is said to offer a ride so smooth, at speeds up to 100 mph, that a glass of water riding on the rear platform barely vibrates. It promises to be a boon to major moviemakers previously stumped by the cost of obtaining professional "moving shots."

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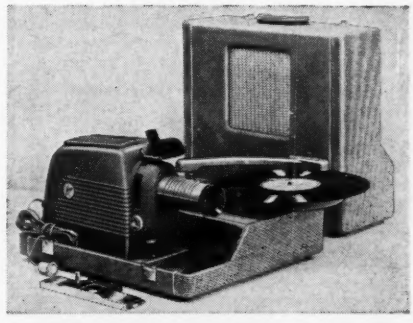

FREE — *How Industry Profits from Sound Films.* Illustrated booklet spells out advantages of using 16mm motion pictures and slidefilms in every phase of business, from training personnel to boosting sales.

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continued from page 87

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New Movie Light 114

Sylvania Electric Products has introduced a new source of illumination for interior motion picture work, the Sun Gun Lamp. Basically intended as a home movie light that does the job of larger, heavier and bulkier barlights, the Sun Gun may also find some industrial applications for quick on-the-spot shooting of newsreel footage. It is a one-piece unit that plugs into AC current and can be mounted onto the camera or hand-held. Illumination is from a quartz halogen lamp, which is said to consume half the current of a four-lamp light bar, have double the lamp life and maintain full strength throughout.

Improved High Speed Camera 116

Beckman & Whitley is now using a special speed-up transmission unit to fill extremely high r.p.m. requirements for their Model 326 Dynafax. The special transmission unit, manufactured by Bowmar Instrument Corp., enables the continuous-writing framing camera to employ a rotating octagonal mirror at speeds up to 100,000 r.p.m. The special assembly steps up 7,100 r.p.m. to achieve this speed. At top speed pictures are exposed 39 microseconds apart, at shuttering speeds between one and five microseconds. Total writing time at top speed is nine milliseconds. The Model 326 Dynafax prints 224 pictures of standard 16mm frame size on a 33-inch length of unperforated 35mm film.

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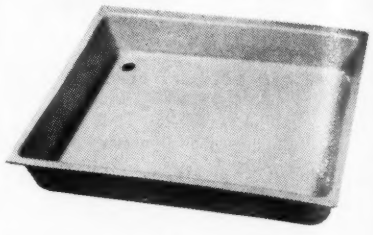

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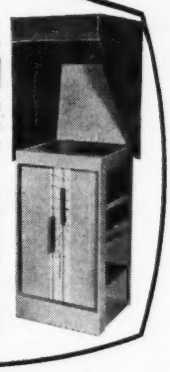

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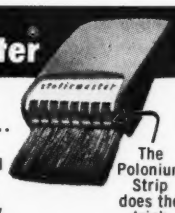

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Printing Material **119**

A new diazo-sensitized material has been introduced by the *Ozalid Division* of General Aniline & Film Corp. Called Hi-Gloss Black Dryphoto, the material reproduces a black glossy photographic print of a film positive on white plastic coated stock. Dryphoto is processed in any standard dry diazo equipment and is handled in ordinary daylight. Processing time can be as much as 50% less than conventional darkroom methods. Another feature of the material is the plastic coating on both sides of the base paper which makes it impervious to water, dirt or grease.

Auto 35 **121**

The field of automatic cameras received another addition recently when the *Eastman Kodak Co.* announced its Retina Automatic III camera. The fully automatic camera sets its lens openings for correct exposure at any shutter speed from 1/30th to 1/500th second. An interesting feature of the automatic system is the lock which is actuated when light levels are too low. This prevents a picture from being taken which would be beyond the capabilities of the *f*/2.8 Retina-Xenar lens. Other features of the camera include a coincident-type rangefinder, all types of flash synchronization, projected frametype viewfinder and rapid film advance lever. Price $129.50.

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A high-speed processor intended for both negative and positive films has been introduced by the *Houston Fearless Corp.* Fast processing is made possible by spray application, using new spray bars for more uniform results. Processing speed of reversal is up to 150 fpm, with a dry to dry time of as little as five minutes. Other new features of the machine include a direct film drive with separate gear boxes for each compartment, automatic film tension control, air squeegees and an electric tachometer. A wax or silicone applicator is optional.

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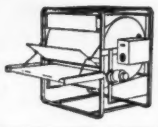

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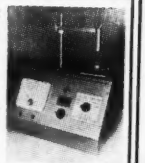

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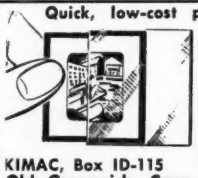

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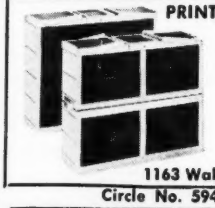

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FLYING TV

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ployed. There was no indication of radiation damage to the film or heat damage during camera pod reentry. The rocket booster free fell with the expended rocket from an altitude of approximately 40 miles to impact on the desert floor.

At the beginning of the program, it was decided that the three cameras would make all four flights, but a spare TKB-3A was purchased in the event of camera malfunction at the time of final checkout at the range. This spare was used on the second shot and was the one camera that was lost.

The Chrysler Corporation Missile Division's photographic mission, as well as the project itself, was a success. The photographs taken verified that the ejection mechanism for the TV capsule met design specifications and that the capsule itself was a stable free-falling body. In general, the concept that a flying TV station can be used as a wartime reconnaissance vehicle is highly feasible. □

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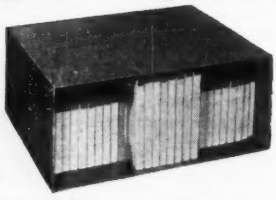

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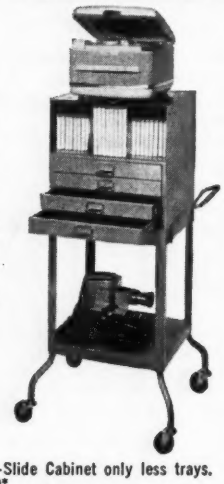
Each section 19″ x 7⅞″ x 7⅞″. May be used independently for wall mounting. Two selections may be stacked back to back with film strip and slide cabinets. Each section holds 27 5″ or 7″ diameter tapes. Gray hammerloid enamel finish. No. 5-7 Tape Cabinets, each sec. $13.00*

Tape and Film Cabinet

Keep your precious recorded tapes, film strips and slides in perfect condition in these specially-designed all-steel cabinets. Photo shows cabinets stacked on

handy cart. Cabinets may be used separately as desired. No. 5-7 5″ Tape Cabinet—19″ x 7⅞″ x 7⅞″ each section $13.00*



No. 10FS Film Strip—Slide Cabinet only less trays. Ship. wt. 42 lbs. $53.00*
No. 10F Tray for 90 film strips. Each $2.00*
No. 10S Tray for 280 2″ x 2″ slides. Each $5.00*
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SHORT CUTS
TO SAVE TIME AND MONEY

CAMERA MASK SOLVES REFLECTION PROBLEMS

This handy camera mask solves the exasperating problem of reflections from a chrome-trimmed camera when making copies from dark-toned originals. Black cloth roomily fitted over the camera is securely held in place by a filter ring and two black elastic bands. Aperture settings, focusing and shutter manipulation are easily managed from the outside by feeling through the cloth. The entire copying operation can be done without removing and replacing the mask at anytime. Every bit of gleaming chromium remains safely under cover at all times despite its location on the camera or its irregular shape.

Get the following material: one "slip-on" filter ring to fit the lens, one yard of 36-inch wide black cloth, 38 inches of black elastic (¾″ wide), model airplane cement and flat black paint.

Cut one piece of cloth 9 x 36″. Fold it double and sew halfway down from fold on each side (Seams A and B) to make a 9-inch pocket with 9-inch flaps.

Drill holes in the filter ring so cloth can be sewed to it.

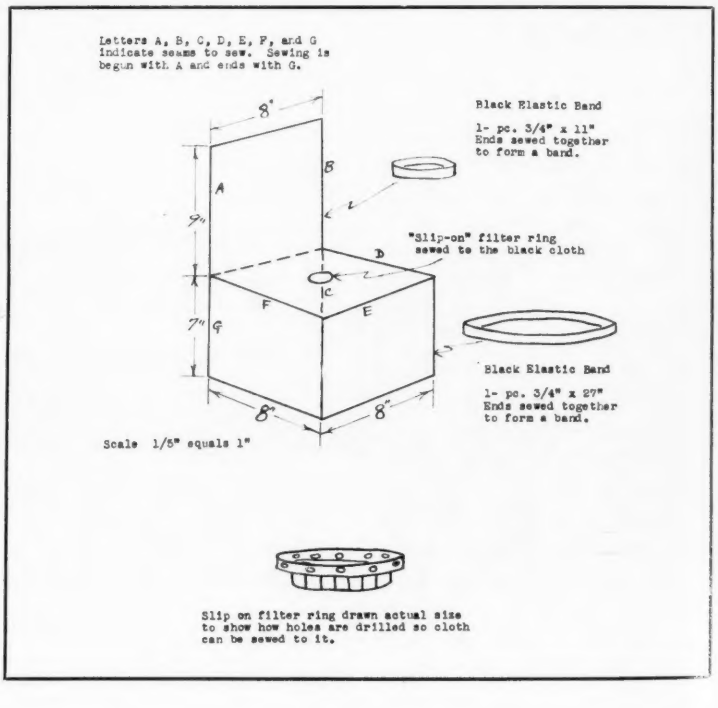
Cut a hole in the center of one flap of pocket and sew in the filter ring.

Cut a piece of cloth 8½ x 36″. Sew one end to the flap of the pocket not having filter ring (Seam C). Then sew edge to pocket flap with filter ring (Seam D). Continue by sewing Seams E and F. Cut off excess length and sew end to edge of flap (Seam G). Hem raw edge of material.

Cut one piece of elastic 11 inches long and sew together into a band. Cut a second piece of elastic 27 inches long for another band.

Cement sewed cloth to ring and cover with flat black paint.

To put the mask on the camera, strip the pocket over the focusing track and put filter ring on lens. A snug fitting ring is important. It enables use of the camera in any position. Next, pull pocket over focusing track; then put the small elastic band on it to hold it in place. Cover the camera body, using the large elastic band to hold the camera in place. — *Robert W. Luebke, Green Bay, Wisconsin.*


Letters A, B, C, D, E, F, and G indicate seams to sew. Sewing is begun with A and ends with G.
8"
Black Elastic Band
1- pc. 3/4" x 11" Ends sewed together to form a band.
A
B
9"
"Slip-on" filter ring sewed to the black cloth
D
C
F
E
7"
G
Black Elastic Band
1- pc. 3/4" x 27" Ends sewed together to form a band.
8"
8"
Scale 1/5" equals 1"
Slip on filter ring drawn actual size to show how holes are drilled so cloth can be sewed to it.